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Stk# 35427

1120A
IEEE-488 Translator

Instruction Manual

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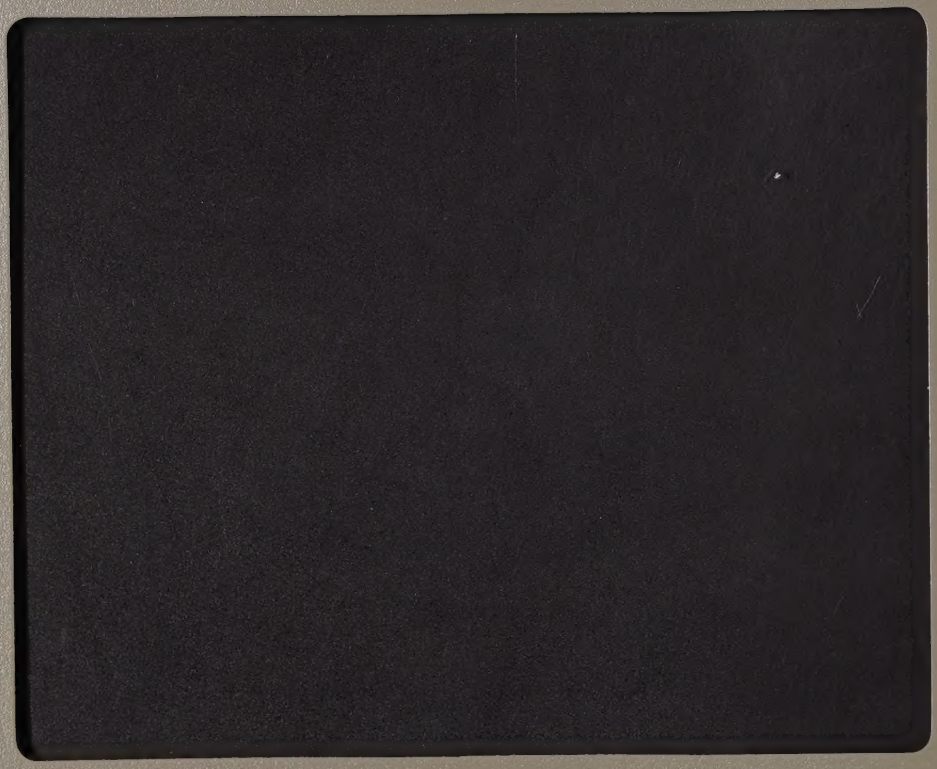

NOTE

This manual documents the Model 1120A IEEE-488 Translator and its assemblies at the revision levels shown in Appendix 7A. If your instrument contains assemblies with different revision letters, it will be necessary for you to either update or backdate this manual. Refer to the supplemental change/errata sheet for newer assemblies, or to the backdating sheet in Appendix 7A for older assemblies.

Stk# 35427

1120A
IEEE-488 Translator

Instruction Manual

P/N 487520
October 1978

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2. On receipt of the shipping instructions, forward the instrument, transportation prepaid. Repairs will be made at the Service Facility and the instrument returned, transportation prepaid.

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CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER

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The JOHN FLUKE MFG. CO., INC, will be happy to answer all applications or use questions, which will enhance your use of this instrument. Please address your requests or correspondence to: JOHN FLUKE MFG. CO., INC., P.O. BOX C9090, EVERETT, WASHINGTON 98206, ATTN: Sales Dept. For European Customers: Fluke (Holland) B.V., P.O. Box 5053, 5004 EB, Tilburg, The Netherlands.

*For European customers, Air Freight prepaid.

John Fluke Mfg. Co., Inc., P.O. Box C9090, Everett, Washington 98206

Rev. 6/81

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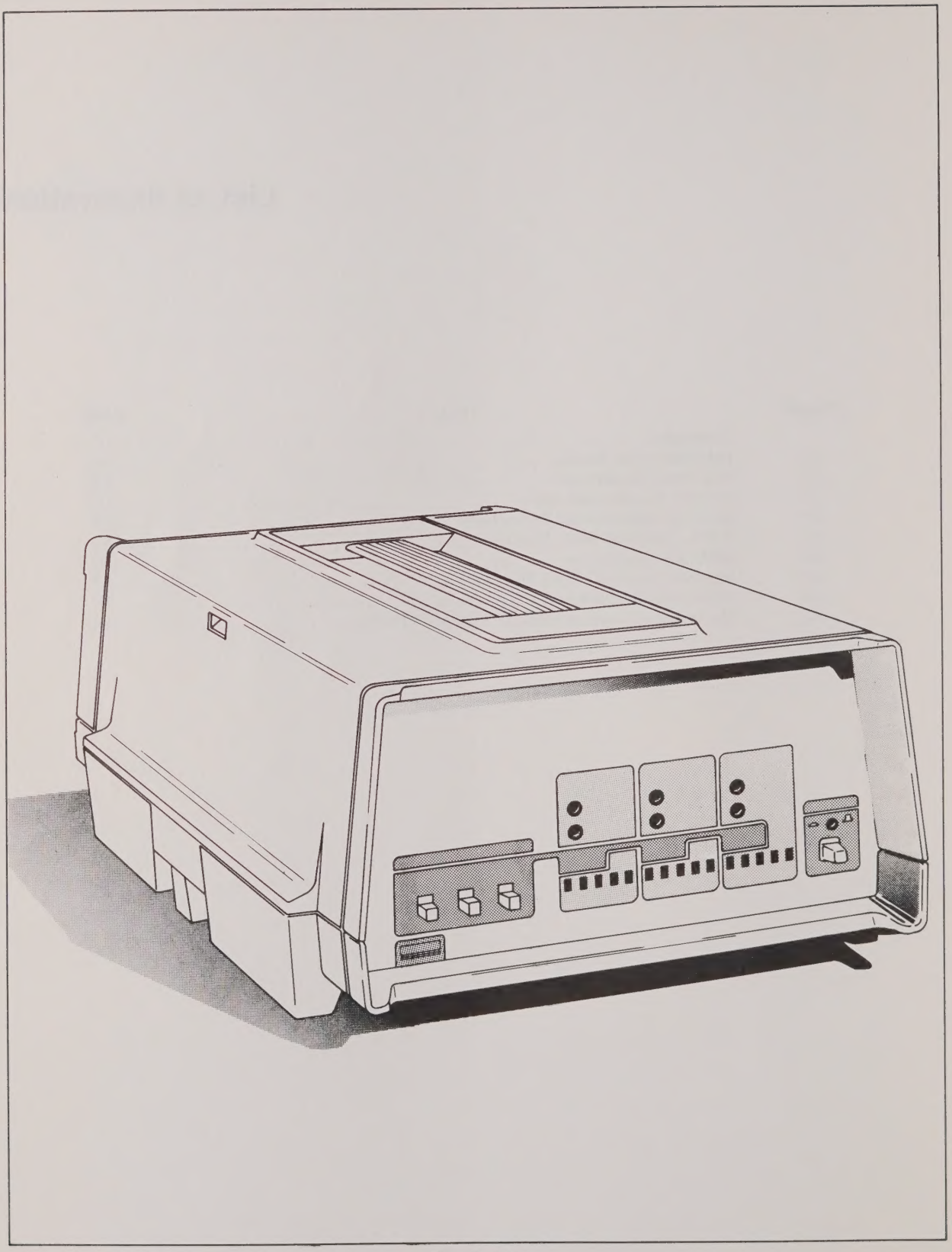


Frontispiece

Section 1
Introduction & Specifications

1-1. INTRODUCTION

1-2. The Model 1120A IEEE-488 Translator is a device for interfacing various Fluke measurement instruments to the IEEE bus. This instrument consists of software translators capable of bidirectionally converting data and codes between the IEEE bus and measurement instruments, and a mainframe to hold and power the software translators. Software translation is accomplished on the Interface PCB Assembly; one, two or three of these assemblies may be plugged into an 1120A mainframe. The Interface PCB Assembly will be briefly described in this manual and detailed in Section 6 of the Instruction Manual for the specific measurement instrument it interfaces to the bus. The 1120A IEEE-488 Translator mainframe is described in this manual.

1-3. The Model 1120A IEEE-488 Translator has been designed in accordance with IEEE STANDARD DIGITAL INTERFACE FOR PROGRAMMABLE INSTRUMENTATION published by the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017.

1-4. DESCRIPTION

1-5. The 1120A mainframe provides all physical and electrical support for up to three Interface PCB Assemblies.

1-6. The 1120A features a standard Portable Test Instrument case. Other Fluke instruments using these cases may be easily stacked, attached and interconnected to form portable, bench-type test systems.

1-7. Field installable Interface PCB Assemblies are available as options to several Fluke measurement instruments.

1-8. With the exception of bus transceivers, each Interface PCB Assembly possesses full interfacing capability. Bus Transceivers are provided on the 1120A Main PCB. The three plug-in Interface positions on the 1120A Main PCB provide identical interfacing support.

1-9. Each Interface PCB Assembly is easily addressed from a controller on the IEEE bus.

1-10. Refer to Table 1-1 for a list of available accessories for the 1120A. Section 6 of this manual provides information on these accessories.

1-11. SPECIFICATIONS

1-12. Specifications for the 1120A, IEEE-488 Translator are given in Table 1-2.

Table 1-1. 1120A Accessories

MODEL NO.	NAME
Y2014	C Size Single Unit Offset Rack Mount
Y2015	C Size Dual Unit Rack Mount
Y2020	C Size Panel Mount
Y7202	Instrument Cable, 2 ft.
Y7203	Instrument Cable, 5 ft.
Y8001	IEEE Standard Cable, 1 Meter
Y8002	IEEE Standard Cable, 2 Meters
Y8003	IEEE Standard Cable, 4 Meters

Table 1-2. Specifications

DIMENSIONS

Size:	10.49 cm H x 32.64 cm L x 20.45 cm D 4.13 in H x 12.85 in L x 8.05 in D
Weight (without Interface Assemblies):	2.55 kg (5 lbs. 10 oz.)

OPERATING POWER

Input Voltage	Frequency
100V 120V 220V 240V	47-63 Hz
Input Power:	22.3W maximum

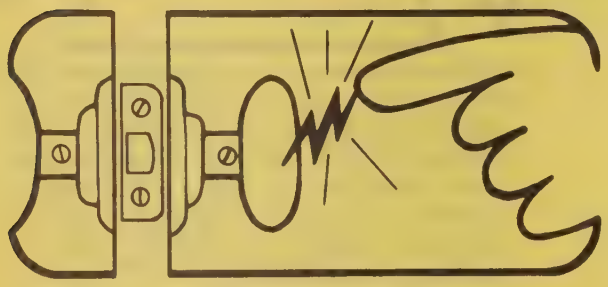
SHOCK AND VIBRATION:	Meets requirements of MIL-T-28800C
OPERATING TEMPERATURE:	0 to 50°C ambient
HUMIDITY	
Storage:	95%
Operating:	70%
INTERFACE FUNCTIONS:	The 1120A will support the following IEEE-488 Interface Functions:

INTERFACE FUNCTION	SYMBOL	CAPABILITY
Source Handshake	SH	FULL
Acceptor Handshake	AH	FULL
Talker or Extended Talker	T or TE	FULL
Listener or Extended Listener	L or LE	FULL
Service Request	SR	FULL
Remote Local	RL	FULL
Parallel Poll	PP	PP0
Device Clear	DC	FULL
Device Trigger	DT	FULL
Controller	C	C0

static awareness

A Message From

John Fluke Mfg. Co., Inc.



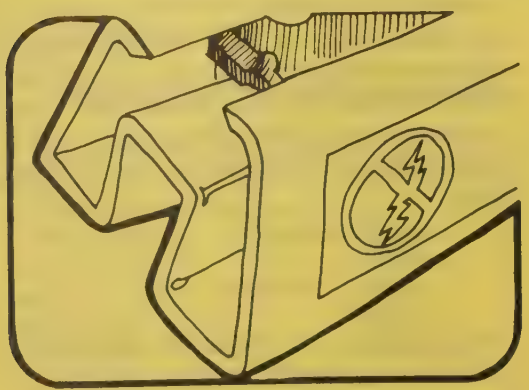
Some semiconductors and custom IC's can be damaged by electrostatic discharge during handling. This notice explains how you can minimize the chances of destroying such devices by:

1. Knowing that there is a problem.
2. Learning the guidelines for handling them.
3. Using the procedures, and packaging and bench techniques that are recommended.

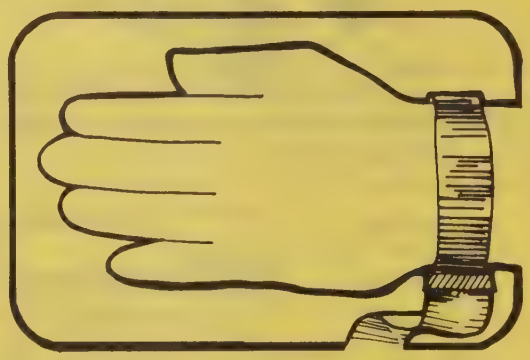
The Static Sensitive (S.S.) devices are identified in the Fluke technical manual parts list with the symbol "⊗"

The following practices should be followed to minimize damage to S.S. devices.

1. MINIMIZE HANDLING

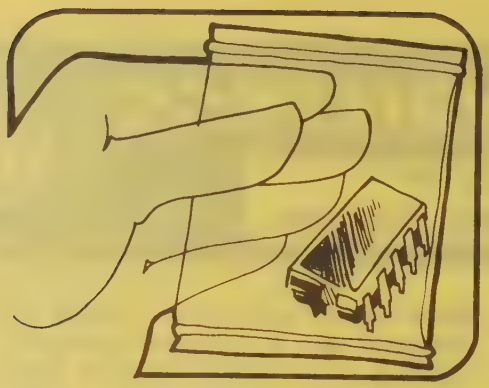


2. KEEP PARTS IN ORIGINAL CONTAINERS UNTIL READY FOR USE.

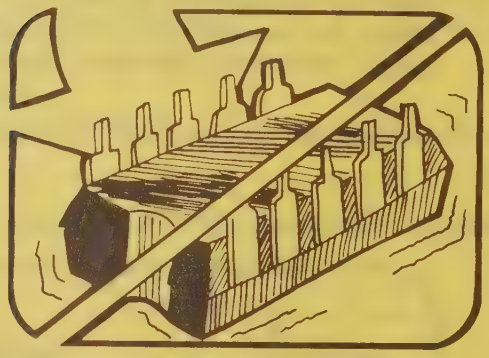


3. DISCHARGE PERSONAL STATIC BEFORE HANDLING DEVICES

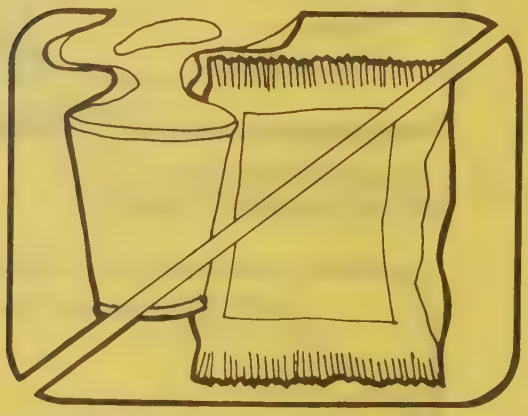
4. HANDLE S.S. DEVICES BY THE BODY



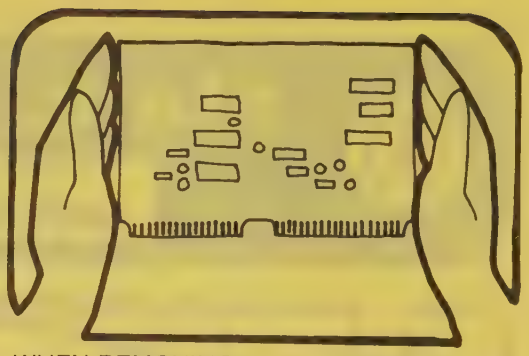
5. USE ANTI-STATIC CONTAINERS FOR HANDLING AND TRANSPORT



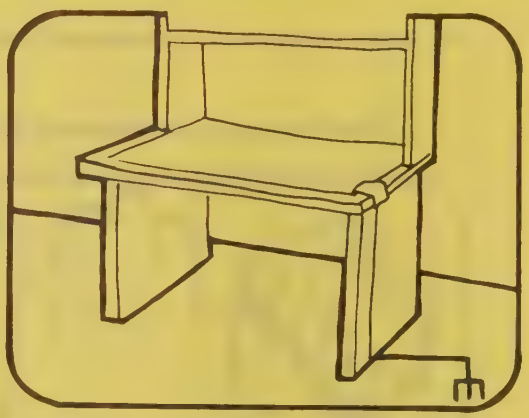
6. DO NOT SLIDE S.S. DEVICES OVER ANY SURFACE



7. AVOID PLASTIC, VINYL AND STYROFOAM® IN WORK AREA



8. WHEN REMOVING PLUG-IN ASSEMBLIES, HANDLE ONLY BY NON-CONDUCTIVE EDGES AND NEVER TOUCH OPEN EDGE CONNECTOR EXCEPT AT STATIC-FREE WORK STATION. PLACING SHORTING STRIPS ON EDGE CONNECTOR USUALLY PROVIDES COMPLETE PROTECTION TO INSTALLED SS DEVICES.



9. HANDLE S.S. DEVICES ONLY AT A STATIC-FREE WORK STATION
10. ONLY ANTI-STATIC TYPE SOLDER-SUCKERS SHOULD BE USED.
11. ONLY GROUNDED TIP SOLDERING IRONS SHOULD BE USED.

Anti-static bags, for storing S.S. devices or pcbs with these devices on them, can be ordered from the John Fluke Mfg. Co., Inc.. See section 5 in any Fluke technical manual for ordering instructions. Use the following part numbers when ordering these special bags.

John Fluke Part No.	Description
453522	6" X 8" Bag
453530	8" X 12" Bag
453548	16" X 24" Bag
454025	12" X 15" Bag
Pink Poly Sheet 30"x60"x60 Mil P/N RC-AS-1200 $20.00	Wrist Strap P/N TL6-60 $7.00

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Section 2
Operating Instructions

2-1. INTRODUCTION

2-2. Installation and operation of the Model 1120A IEEE-488 Translator is explained in this section. Read this information before attempting to operate the unit. Should any difficulties arise, contact your nearest Fluke Sales Representative (list in Section 7), or the John Fluke Mfg. Co., Inc. (P.O. Box 43210, Mountlake Terrace, WA, 98043; tel. 206 774-2211).

2-3. SHIPPING INFORMATION

2-4. The 1120A is packaged and shipped in a foam-packed container. Upon receipt of the instrument, a thorough inspection should be made to reveal any possible shipping damage. Special instructions for inspection and claims are included with the shipping container.

2-5. If reshipment is necessary, the original container should be used. If the original container is not available, a new container can be obtained from John Fluke Mfg. Co., Inc. Please reference the instrument model number (1120A) when requesting a new shipping container.

2-6. INSTALLATION

2-7. Interface PCB Assembly Installation

2-8. Installation of the Interface PCB Assemblies necessitates removal of the 1120A's top cover. Do not remove the cover at this time.

CAUTION

Hazardous voltage may be present when the 1120A's top cover is removed. Installation of the Interface PCB Assemblies should be performed by qualified personnel only.

2-9. Refer to Instrument Disassembly and Interface PCB Assembly Installation in Section 4 of this manual for correct procedures, then return to this section for further INSTALLATION procedures.

2-10. Input Power

2-11. Line power is connected to the 1120A via a rear panel three-prong connector and power cord. the offset prong on this connector should be attached through the power cord to a high quality earth ground. Refer to Section 4 of this manual for line voltage selection and fuse replacement instructions.

2-12. Case Mating

2-13. The 1120A is housed in a special molded plastic instrument case. Measurement instruments connected to the IEEE-488 bus via the 1120A are usually packaged in similar cases. These rugged cases feature non-marring feet and a tilt down bail. The cases are compatible, regardless of size; they can be stacked vertically (as illustrated in Figure 2-1) and latched together to form portable test systems. Instrument stacks should be limited to a total height of three feet and a total weight of 40 pounds.

2-14. Use the following procedure when attaching PTI-encased instruments:

1. For the top instrument, pull out latches found on either side of the instrument.
2. Nestle top and bottom instrument together.
3. Push latches in to secure instruments together.

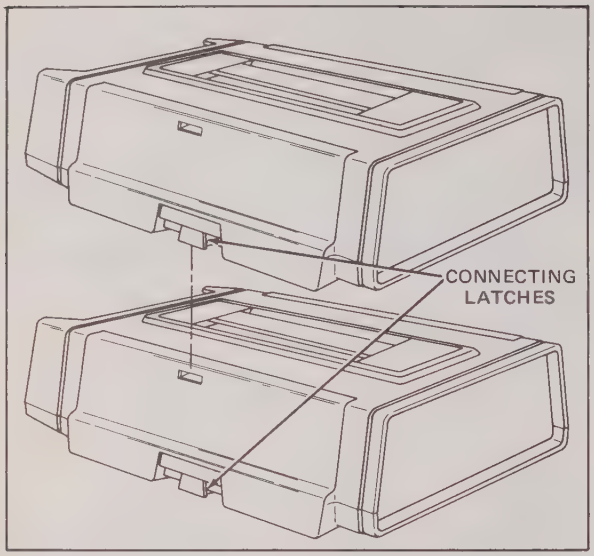

Figure 2-1. Instrument Case Mating

2-15. IEEE-488 Bus Connections

2-16. The IEEE bus and measurement instrument connections to the 1120A's rear panel can be seen in Figure 2-2. Figure 2-3, then illustrates a system's connection of the 1120A, interfaced instruments, and other devices on the IEEE-488 bus. The IEEE cable attaches to the IEEE connector, located in the middle of the rear panel (item A in Figure 2-2). This connector mates with standard 24 conductor IEEE cables.

NOTE

The IEEE connector is designed to receive IEEE cables with metric threaded securing screws only.

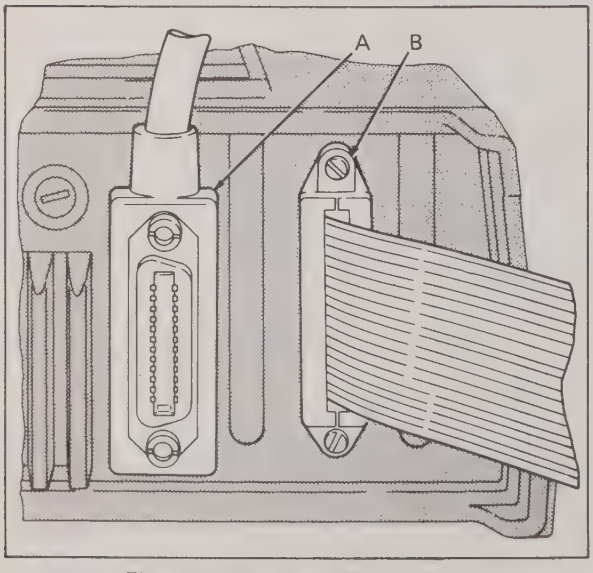

Figure 2-2. Rear Panel Connections

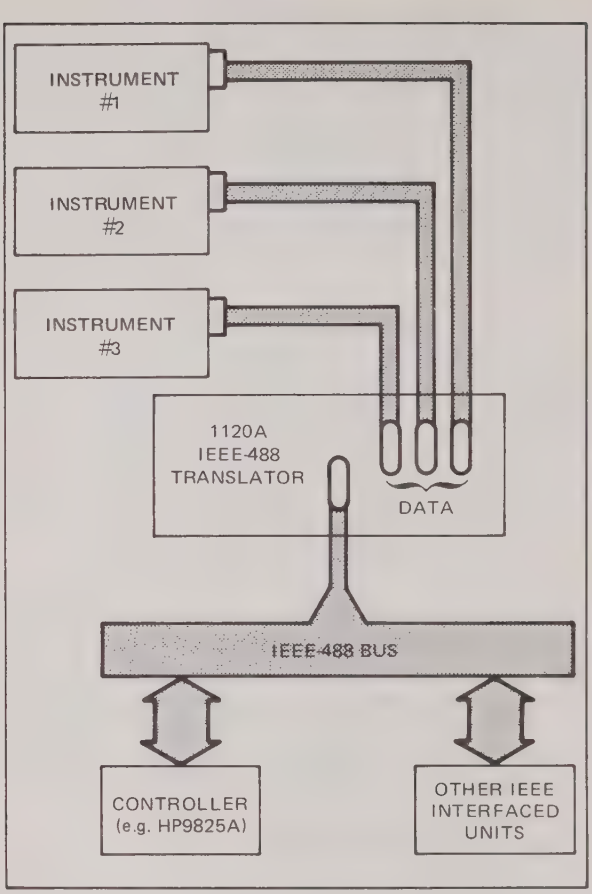

Figure 2-3. Interface System Connections

2-17. IEEE Bus Restrictions

2-18. IEEE-488 bus interconnections are confined within the following limitations:

1. No more than 15 devices may be connected in a single IEEE bus system.

2. The total length of cable used in one IEEE bus system must not exceed 20 meters.

3. The total length of cable must also not exceed 2 meters times the number of devices in the system.

2-19. Combinations of 1, 2, or 4 meter IEEE cables can be used to meet the cable length restrictions. For example, when connecting a controller to one 1120A, a 1, 2, or 4 meter cable may be used (2 meters times two devices = 4 meters). When connecting more than 10 devices, a combination of 1, 2, or 4 meter cables can be used (not to equal more than 20 meters). Available cables are listed in Table 1-1.

2-20. IEEE Cables may be interconnected in any desired configuration. Total cable length is the only

Option 2XXXA-522
IEEE Interface Assembly

INTRODUCTION

The IEEE Interface PCB (Option 2XXXA-522) when installed in the Model 1120A IEEE-488 Translator, provides data format conversion between Models 2180A, 2190A Thermometers, and Model 2300A Scanner, and the IEEE-488 Bus (Standard 488, Digital Interface for Programmable Instrumentation hereafter referred to as IEEE-488). The IEEE Interface PCB can be addressed as either listener or a talker. The PCB is field installable using procedures given under Installation.

Information pertinent to IEEE-488 Bus operations can be found in the 1120A Instruction Manual. Additionally, the IEEE-488 Standard Digital Interface for Programming Instrumentation, published by the Institute of Electrical and Electronic Engineers, 345 East 47th Street, New York, NY 10017, can be consulted for more detailed information.

SPECIFICATIONS

Specifications for the Option 2XXXA-522 IEEE Interface PCB are given in Table 1.

DESCRIPTION

The IEEE Interface PCB is a standard size personality card for the 1120A and will operate from any pcb/personality card position selected. The 1120A supplies +5 volts power to the IEEE Interface PCB. The PCB can be basically divided up into three sections: The UART (Universal Asynchronous Receiver Transmitter), which includes a preset 2400 baud clock. The MPU (microprocessor unit), and the GPIA (General Purpose Interface Adapter). Functionally, there are two modes of operation; The listen mode and the talk mode. In the listen mode, data from the IEEE-488 Bus is converted from parallel form to serial form for output. In the talk

Table 1. Specifications

Operating Power: +5 volts ±10%

Operating Temp: 0-50°C ambient

IEEE-488 Interface Functions Implemented:

SH1	Source Handshake	Full capability
AH1	Acceptor Handshake	Full capability
T6	Talker	Serial poll, not talk only
L4	Listener	Not listen only (See Note)
SR1	Service Request	Full capability

NOTE: The L4 Listener function signifies that the thermometer IEEE-488 Bus Interface has the same 5 digit talk and listen addresses and that the receipt of a listen address will unaddress the talk address. The Models 2180A and 2190A Thermometers do not accept any data in the listen mode and are not remotely programmable.

CHANGE/ERRATA INFORMATION

ISSUE NO: 2 9/79

This change/errata contains information necessary to ensure the accuracy of the following manual. Enter the corrections in the manual if either one of the following conditions exist:

1. The revision letter stamped on the indicated PCB is equal to or higher than that given with each change.

2. No revision letter is indicated at the beginning of the change/errata.

MANUAL

Title: 1120A IEEE-488 TRANSLATOR
Print Date: October 1978
Rev. and Date: ------

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restriction. It is also recommended that not more than three cables be stacked together at the 1120A IEEE connector; structural damage to the connector mounting could result.

2-21. Connection to the Interfaced Instrument

2-22. Connection to the measurement instrument is made via a ribbon cable to the connector mounted on the plug-in Interface PCB Assembly and accessible on the 1120A's rear panel (item B in Figure 2-2).

2-23. Addressing

2-24. Each Interface PCB Assembly within the 1120A can be assigned a unique IEEE-488 address. This 5-bit address is assigned by the front panel switches (A3, A4, A5 bits) in combination with the position of the Interface PCB Assembly within the 1120A (A1, A2 bits). As illustrated on the 1120A's front panel, the leftmost Interface PCB Assembly will have the lower two bits of 00. Table 2-1 lists the possible Interface PCB Addresses and their respective ASCII talk and listen characters.

2-25. For example, if you select a decimal number address of "6", front panel switches must be set to 0 (A5), 0 (A4), 1 (A3) and the Interface PCB Assembly must be positioned in slot 2 within the 1120A (for address of 1 (A2) and 0 (A1)).

2-26. Any address from Table 2-1 may be assigned. Ensure, however, that the address assigned does not conflict with one already used for another instrument on the IEEE bus.

2-27. OPERATING FEATURES

2-28. Controls, indicators and connectors for the 1120A can be located with the aid of Figure 2-4 and defined using Table 2-2.

2-29. OPERATING DIRECTIONS

2-30. Use the following procedure to operate the 1120A, IEEE-488 Translator:

1. Ensure that all IEEE bus measurement instrument power connections have been properly made and that appropriate Interface PCB Assemblies have been installed in the 1120A.

2. Set the 1120A front panel switches A3, A4 and A5 for the desired address.

3. On the 1120A, press power ON (Power LED will light).

4. The 1120A is now ready to be used in the system. For further operating directions and program codes appropriate to the instrument being interfaced, refer to the instruction manual provided with that instrument.

Table 2-1. Addressing

Decimal Number Address	Equivalent ASCII Character		Front Panel Selectable			Position Selectable	
	Talk	Listen	A5	A4	A3	A2	A1
0	@	SP				0	0
1	A	!	0	0	0	0	1
2	B	"				1	0
4	D	$				0	0
5	E	%	0	0	1	0	1
6	F	&				1	0
8	H	(				0	0
9	I	)	0	1	0	0	1
10	J	*				1	0
12	L	,				0	0
13	M	–	0	1	1	0	1
14	N	.				1	0
16	P	0				0	0
17	Q	1	1	0	0	0	1
18	R	2				1	0
20	T	4				0	0
21	U	5	1	0	1	0	1
22	V	6				1	0
24	X	8				0	0
25	Y	9	1	1	0	0	1
26	Z	:				1	0
28	\	<				0	0
29	]	=	1	1	1	0	1
30	^	>				1	0

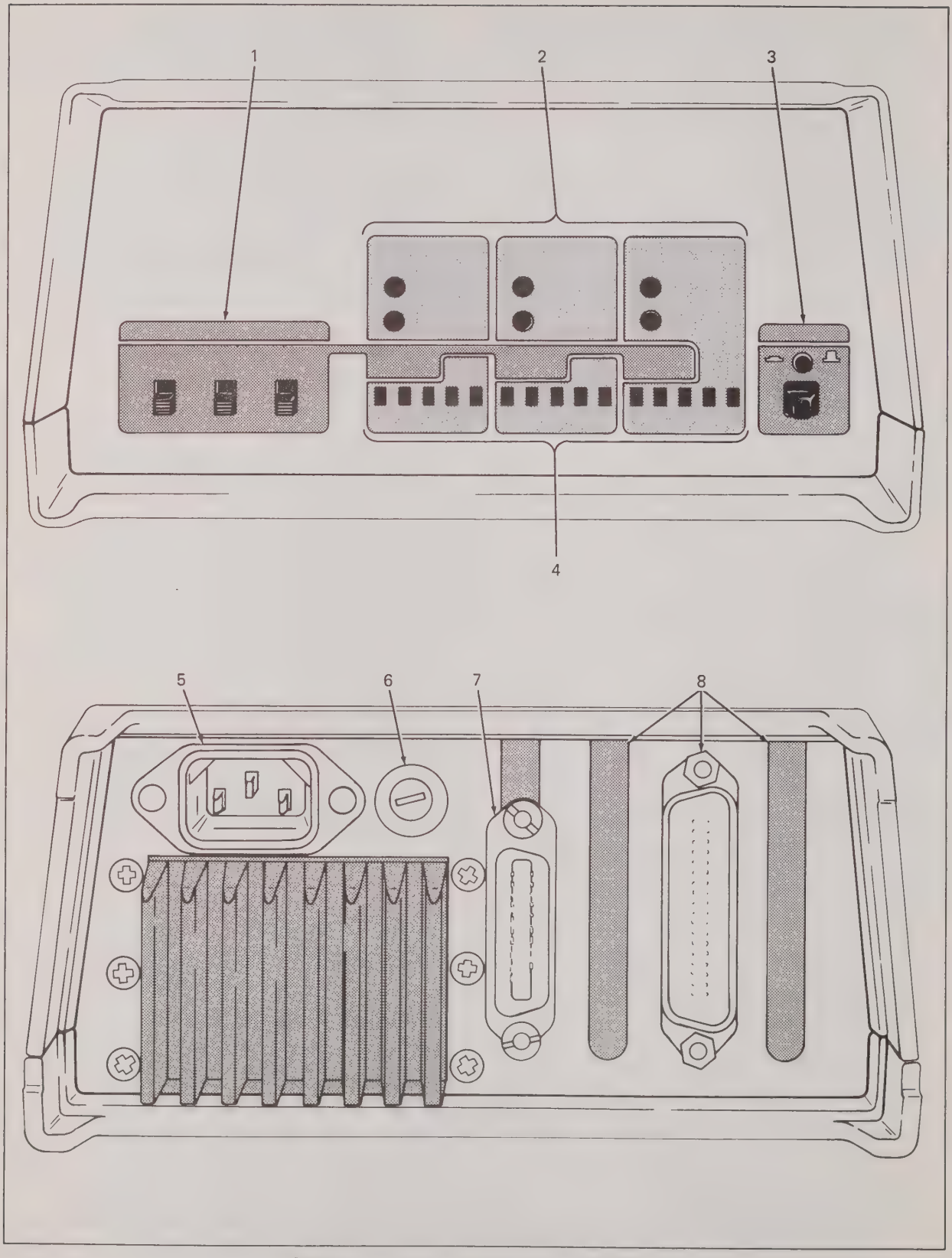

Figure 2-4. Controls, Indicators and Connections

Table 2-2. Controls, Indicators and Connectors

REF NO.	NAME	FUNCTION
1	ADDRESS SELECT	Three switches select the three most significant bits of the IEEE bus address.
2	TALK/LISTEN Indicators	Provide LED indication of talk or listen status for each of the three interface positions.
3	POWER Switch	Push ON, push STBY.
4	Position Bits	Indicates the two least significant bits of the IEEE address for each Interface PCB Assembly.
5	Power Connector	Three-prong connector accepting line cord with ground wire.
6	Line Fuse	Use AGC 1/4A for 100 or 120V, AGC 1/8A for 220 or 240V.
7	IEEE-488 Connector	Accepts standard IEEE-488, 24-pin connector with metric screw tighteners.
8	Instrument Connector	Accepts 36-pin connector for interfacing measurement instrument.

Section 3
Theory of Operation

3-1. INTRODUCTION

3-2. A functional description and a circuit description of the 1120A will be presented in this section. Refer to Section 8 for detailed schematic diagrams and a list of mnemonics.

3-3. OVERALL FUNCTIONAL DESCRIPTION

3-4. The Model 1120A IEEE-488 Translator provides for interfacing between the IEEE bus and three measurement instruments. The Translator features a standard interface assembly (microprocessor control), front panel addressing and bidirectional bus receiver-drivers. Refer to Figure 3-1 for a functional block view of circuit operation.

3-5. Address

3-6. The 5-bit address setting (A1 through A5) for the Interface PCB Assemblies is defined by the IEEE-488 standard. Each of the three interface assembly connectors is permanently specified at a unique address for bits A1 and A2. The remaining three address bits (A3, A4, A5) are assignable via the 1120A front panel switch setting. A total of 24 Interface PCB Addresses are thus available. Refer to Table 2-2 for address definition and applicable ASCII talk and listen characters.

3-7. IEEE Bus

3-8. The 1120A has been designed according to specifications presented in IEEE STANDARD DIGITAL INTERFACE FOR PROGRAMMABLE

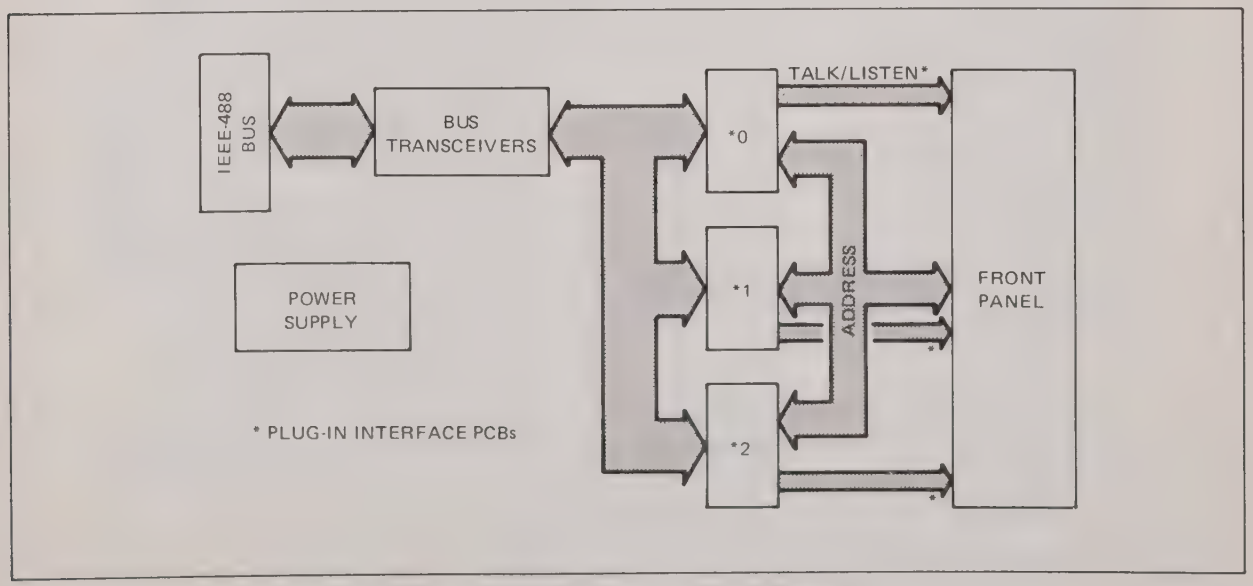

Figure 3-1. 1120A Functional Block Diagram

INSTRUMENTATION published by the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York NY 10017. A brief description of IEEE-488 bus structure will be presented in this section.

3-9. IEEE-488 bus is an interfacing arrangement suited for programmable measurement instrumentation systems. The 16 bus transmission lines provide for all data and message transfer and control. Bus lines are defined under the following three categories:

1. Eight data bus lines ($\overline{DIO1}$-$\overline{DIO8}$) data or address information will be carried on these lines in bit-parallel, byte-serial format. Information transfer on these lines is asynchronous and bidirectional.

2. Three handshake lines:

   $\overline{DAV}$ (Data Valid) indicates to a receiver that data is available on the $\overline{DIO}$ lines.

   $\overline{NRFD}$ (Not Ready for Data) indicates whether all devices are ready to accept data.

   $\overline{NDAC}$ (Not Data Accepted) indicates the acceptance of data by all devices.

3. Five bus management lines:

   $\overline{ATN}$ (Attention) when true, $\overline{DIO1}$-$\overline{DIO8}$ will carry addresses or commands; when false $\overline{DIO1}$-$\overline{DIO8}$ carry data.

   $\overline{IFC}$ (Interface Clear) places talkers and listeners into an idle state.

   $\overline{SRQ}$ (Service Request) used by a device to indicate need for service and request an interrupt.

   $\overline{REN}$ (Remote Enable) when true, enables devices addressed as listeners to be remotely programmed.

   $\overline{EOI}$ (End Or Identify) indicates the end of multiple byte transfers. When sent with $\overline{ATN}$ true, indicates a parallel poll sequence.

3-10. A maximum of 15 devices may be interconnected on one contiguous bus structure. These devices may perform any combination of the following functions: talk, listen or control. Figure 3-2 illustrates typical connections on the IEEE-488 bus. Table 3-1 defines remote message coding used on the bus. Table 3-2 provides equivalent forms for the ASCII characters.

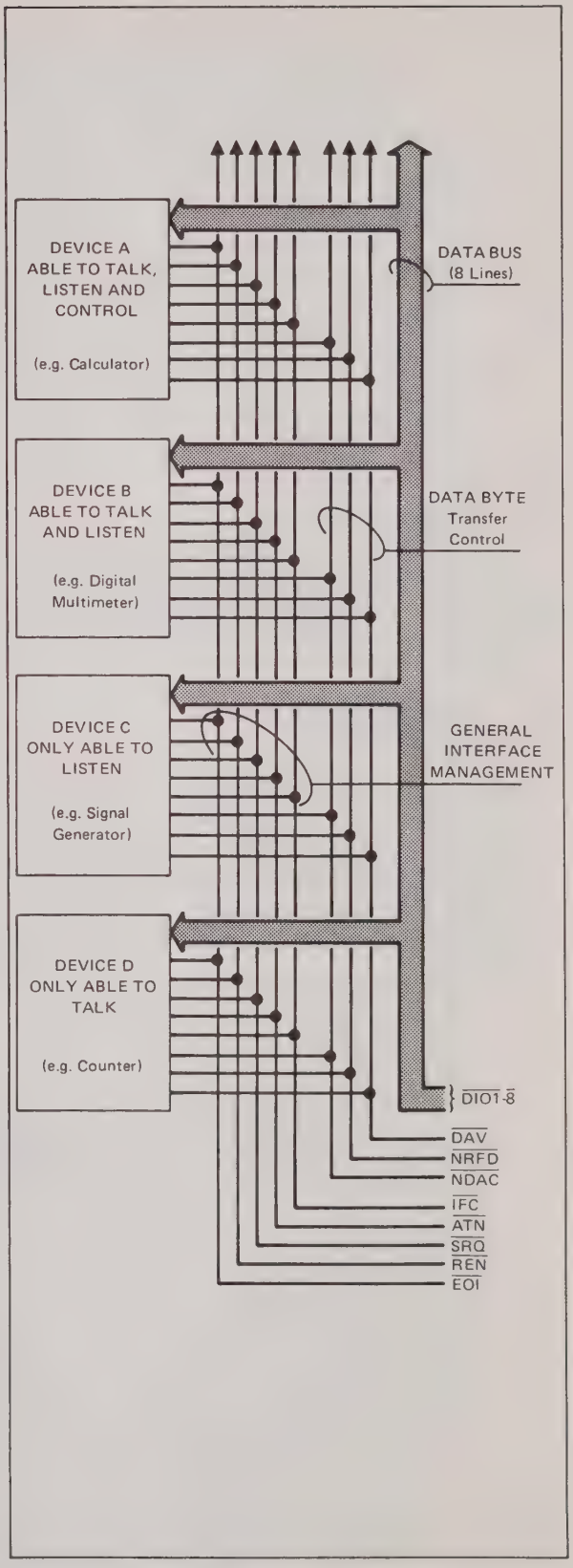

Figure 3-2. IEEE Bus Connections

Table 3-1. Remote Message Coding

MNEMONIC	MESSAGE NAME	BUS SIGNAL LINE(S) AND CODING THAT ASSERT MESSAGE TRUE													MESSAGE TYPE	MESSAGE CLASS	NOTES
		DATA I/O								BUS MANAGEMENT							
		DIO8	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	ATN	EOI	SRQ	IFC	REN			
ACG	Addressed Command Group	X	0	0	0	X	X	X	X	1	X	X	X	X	M	AC	
ATN	Attention	X	X	X	X	X	X	X	X	1	X	X	X	X	U	UC	
DAB	Data Byte	D8	D7	D6	D5	D4	D3	D2	D1	X	X	X	X	X	M	DD	1, 6
DCL	Device Clear	X	0	0	1	0	1	0	0	1	X	X	X	X	M	UC	
END	End	X	X	X	X	X	X	X	X	X	1	X	X	X	U	ST	7
EOS	End Of String	E8	E7	E6	E5	E4	E3	E2	E1	X	X	X	X	X	M	DD	2, 7
GET	Group Execute Trigger	X	0	0	0	1	0	0	0	1	X	X	X	X	M	AC	
GEL	Go To Local	X	0	0	0	0	0	0	1	1	X	X	X	X	M	AC	
IDY	Identify	X	X	X	X	X	X	X	X	1	1	X	X	X	U	UC	
IFC	Interface Clear	X	X	X	X	X	X	X	X	X	X	X	X	1	U	UC	
LAG	Listen Address Group	X	0	1	X	X	X	X	X	1	X	X	X	X	M	AD	
LLO	Local Lock Out	X	0	0	1	0	0	0	1	1	X	X	X	X	M	UC	
MLA	My Listen Address	X	0	1	L5	L4	L3	L2	L1	1	X	X	X	X	M	AD	3
MTA	My Talk Address	X	1	0	T5	T4	T3	T2	T1	1	X	X	X	X	M	AD	4
MSA	My Secondary Address	X	1	1	S5	S4	S3	S2	S1	1	X	X	X	X	M	SE	5
NUL	Null Byte	0	0	0	0	0	0	0	0	X	X	X	X	X	M	DD	
OSA	Other Secondary Address	(OSA = SCG • MSA)													M	SE	
OTA	Other Talk Address	(OTA = TAG • MTA)													M	AD	
PCG	Primary Command Group	(PCG = ACG + UCG + LAG + TAG)													M	—	
REN	Remote Enable	X	X	X	X	X	X	X	X	X	X	X	X	1	U	UC	
RQS	Request Service	X	1	X	X	X	X	X	X	X	X	X	X	X	U	ST	7
SCG	Secondary Command Group	X	1	1	X	X	X	X	X	1	X	X	X	X	M	SE	
SDC	Selected Device Clear	X	0	0	0	0	1	0	0	1	X	X	X	X	M	AC	
SPD	Serial Poll Disable	X	0	0	1	1	0	0	1	1	X	X	X	X	M	UC	
SPE	Serial Poll Enable	X	0	0	1	1	0	0	0	1	X	X	X	X	M	UC	
SRQ	Service Request	X	X	X	X	X	X	X	X	X	X	1	X	X	U	ST	
STB	Status Byte	S8	X	S6	S5	S4	S3	S2	S1	X	X	X	X	X	M	ST	6, 7
TCT	Take Control	X	0	0	0	1	0	0	1	1	X	X	X	X	M	AC	
TAG	Talk Address Group	X	1	0	X	X	X	X	X	1	X	X	X	X	M	AD	
UCG	Universal Command Group	X	0	0	1	X	X	X	X	1	X	X	X	X	M	UC	
UNL	Unlisten	X	0	1	1	1	1	1	1	1	X	X	X	X	M	AD	
UNT	Untalk	X	1	0	1	1	1	1	1	1	X	X	X	X	M	AD	

SYMBOLS:

Type — U = Uniline Message; M = Multiline Message

Class — AC = Address Command; AD = Address (Talk or Listen); DD = Device Dependent; HS = Handshake; UC = Universal Command; SE = Secondary; ST = Status

0 = Logical Zero (HIGH Signal Level)

1 = Logical One (LOW Signal Level)

X = Don't Care or Not Driven

NOTES:

(1) D1—D8 specify the device dependent data bits.

(2) E1—E8 specify the device dependent code used to indicate the EOS message.

(3) L1—L5 specify the device dependent bits of the device's listen address.

(4) T1—T5 specify the device dependent bits of the device's talk address.

(5) S1—S5 specify the device dependent bits of the device's secondary address.

(6) S1—S6, S8 specify the device dependent status. (DIO7 is used for the RQS message).

(7) The true message value must be ignored when received if the LACS is inactive.

Table 3-2. ASCII Character Set

ASCII CHAR.	EQUIVALENT FORMS				ASCII CHAR.	EQUIVALENT FORMS				ASCII CHAR.	EQUIVALENT FORMS			
	BINARY	OCTAL	DEC	HEX		BINARY	OCTAL	DEC	HEX		BINARY	OCTAL	DEC	HEX
NUL	00000000	000	0	00	+	00101011	053	43	2B	V	01010110	126	86	56
SOH	00000001	001	1	01	,	00101100	054	44	2C	W	01010111	127	87	57
STX	00000010	002	2	02	–	00101101	055	45	2D	X	01011000	130	88	58
ETX	00000011	003	3	03	.	00101110	056	46	2E	Y	01011001	131	89	59
EOT	00000100	004	4	04	/	00101111	057	47	2F	Z	01011010	132	90	5A
ENQ	00000101	005	5	05	0	00110000	060	48	30	[	01011011	133	91	5B
ACK	00000110	006	6	06	1	00110001	061	49	31	\	01011100	134	92	5C
BEL	00000111	007	7	07	2	00110010	062	50	32	]	01011101	135	93	5D
BS	00001000	010	8	08	3	00110011	063	51	33	^	01011110	136	94	5E
HT	00001001	011	9	09	4	00110100	064	52	34	_	01011111	137	95	5F
LF	00001010	012	10	0A	5	00110101	065	53	35	`	01100000	140	96	60
VT	00001011	013	11	0B	6	00110110	066	54	36	a	01100001	141	97	61
FF	00001100	014	12	0C	7	00110111	067	55	37	b	01100010	142	98	62
CR	00001101	015	13	0D	8	00111000	070	56	38	c	01100011	143	99	63
SO	00001110	016	14	0E	9	00111001	071	57	39	d	01100100	144	100	64
SI	00001111	017	15	0F	:	00111010	072	58	3A	e	01100101	145	101	65
DLE	00010000	020	16	10	;	00111011	073	59	3B	f	01100110	146	102	66
DC1	00010001	021	17	11	<	00111100	074	60	3C	g	01100111	147	103	67
DC2	00010010	022	18	12	=	00111101	075	61	3D	h	01101000	150	104	68
DC3	00010011	023	19	13	>	00111110	076	62	3E	i	01101001	151	105	69
DC4	00010100	024	20	14	?	00111111	077	63	3F	j	01101010	152	106	6A
NAK	00010101	025	21	15	@	01000000	100	64	40	k	01101011	153	107	6B
SYN	00010110	026	22	16	A	01000001	101	65	41	l	01101100	154	108	6C
ETB	00010111	027	23	17	B	01000010	102	66	42	m	01101101	155	109	6D
CAN	00011000	030	24	18	C	01000011	103	67	43	n	01101110	156	110	6E
EM	00011001	031	25	19	D	01000100	104	68	44	o	01101111	157	111	6F
SUB	00011010	032	26	1A	E	01000101	105	69	45	p	01110000	160	112	70
ESC	00011011	033	27	1B	F	01000110	106	70	46	q	01110001	161	113	71
FS	00011100	034	28	1C	G	01000111	107	71	47	r	01110010	162	114	72
GS	00011101	035	29	1D	H	01001000	110	72	48	s	01110011	163	115	73
RS	00011110	036	30	1E	I	01001001	111	73	49	t	01110100	164	116	74
US	00011111	037	31	1F	J	01001010	112	74	4A	u	01110101	165	117	75
space	00100000	040	32	20	K	01001011	113	75	4B	v	01110110	166	118	76
!	00100001	041	33	21	L	01001100	114	76	4C	w	01110111	167	119	77
"	00100010	042	34	22	M	01001101	115	77	4D	x	01111000	170	120	78
#	00100011	043	35	23	N	01001110	116	78	4E	y	01111001	171	121	79
$	00100100	044	36	24	O	01001111	117	79	4F	z	01111010	172	122	7A
%	00100101	045	37	25	P	01010000	118	80	50	{	01111011	173	123	7B
&	00100110	046	38	26	Q	01010001	121	81	51	¦	01111100	174	124	7C
'	00100111	047	39	27	R	01010010	122	82	52	}	01111101	175	125	7D
(	00101000	050	40	28	S	01010011	123	83	53	~	01111110	176	126	7E
)	00101001	051	41	29	T	01010100	124	84	54	DEL	01111111	177	127	7F
*	00101010	052	42	2A	U	01010101	125	85	55					

NUL Null
SOH Start of Heading
STX Start of Text
ETX End of Text
EOT End of Transmission
ENQ Enquiry
ACK Acknowledge
BEL Bell
BS Backspace
HT Horizontal Tab
LF Line Feed

VT Vertical Tab
FF Form Feed
CR Carriage Return
SO Shift Out
SI Shift In
DLE Data Link Escape
DC1 Device Control 1
DC2 Device Control 2
DC3 Device Control 3
DC4 Device Control 4
NAK Negative Acknowledge

SYN Synchronous Idle
ETB End of Transmission Block
CAN Cancel
EM End of Medium
SUB Substitute
ESC Escape
FS File Separator
GS Group Separator
RS Record Separator
US Unit Separator

3-11. Bus Transceivers

3-12. The 1120A features separate receiver-drivers for each IEEE bus line. Power drain on internal lines is thereby minimized while providing the drive necessary for the IEEE-488 bus. Most internal lines (between the bus transceivers and the Interface PCB Assembly) will be bidirectional. Inputs only from the bus will found on $\overline{ATN}$, $\overline{REN}$, ATN and $\overline{IFC}$. Outputs only to the bus occur on $\overline{SRQ}$.

3-13. No device interfaced via the 1120A can perform controller functions or respond to a parallel poll. The 1120A data bus transceivers will go to open-collector mode when a parallel poll is implemented on the bus; other devices are thereby able to respond to parallel poll.

3-14. Interface Assembly

3-15. The Interface PCB Assemblies, each separately addressed as a listener or talker on the bus, translate IEEE-488 codes and signals for compatible communications with measurement instruments. When addressed as a listener, each plug-in Interface PCB Assembly will receive programming codes from a controller; when addressed as a talker, the pcb will send data from the measurement instrument to the controller or to other listeners. Figure 3-3 provides a functional block outline of a typical Interface PCB Assembly operation.

3-16. As an example of interface operation with a counter, the Interface System Processor function provides routing and control of measurement instrument data via the internal data bus. This processor will receive programming data from the IEEE processor function and control the measurement instrument data gathering process through the output functional block. The Interface System Processor will also communicate measurement instrument data from the input functional block to the IEEE processor.

3-18. CIRCUIT DESCRIPTION

3-19. The following circuit description will be referenced to the Simplified Schematic Diagram (Figure 3-4). Detailed schematic diagrams of the Main PCB, the Front Panel PCB and the IEEE PCB will be found in Section 8.

NOTE

The 1120A employs low-true logic on lines identifed by barred mnemonics (e.g., $\overline{ATN}$). High-true logic is used on all other lines (e.g., PA1).

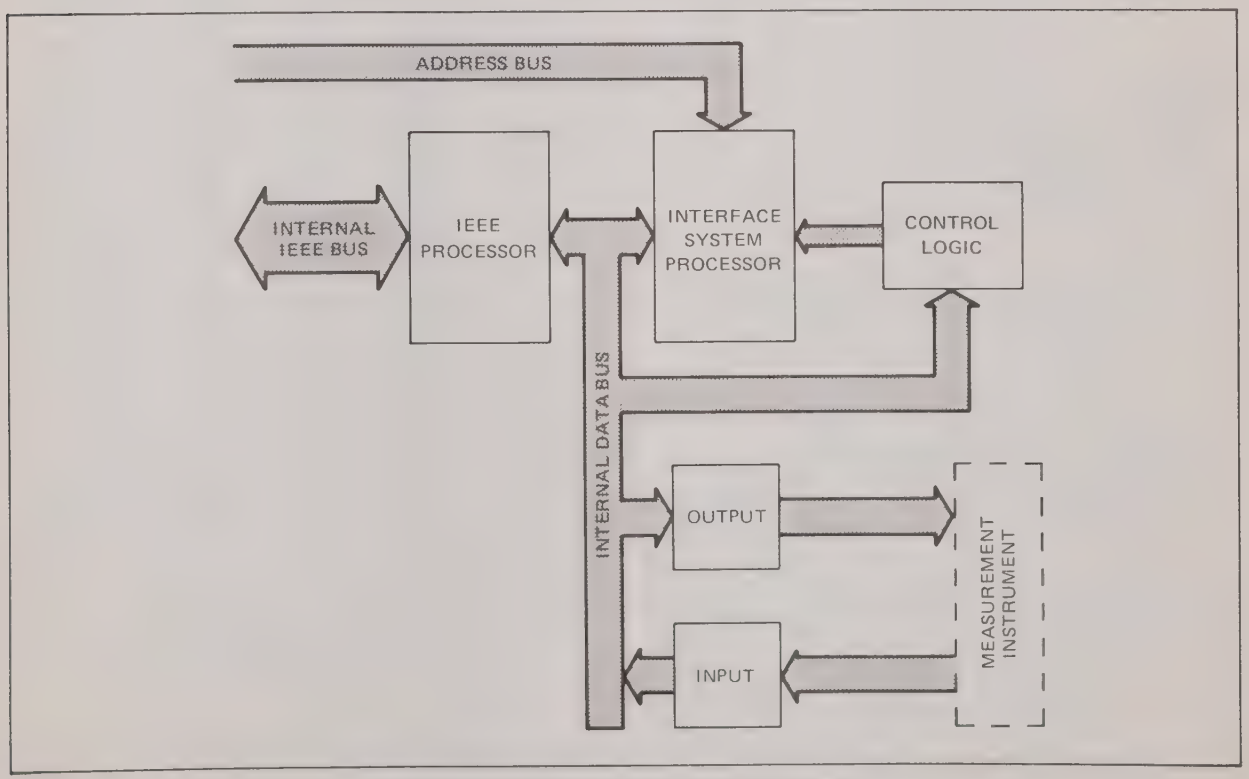

Figure 3-3. Interface Functional Block Diagram

3-20. Power Supply

3-21. The 1120A Power Supply provides +5V ±10% to circuits in the 1120A Main PCB Assembly, and to each plug-in Interface PCB Assembly. Differing line voltages are accommodated through the positioning of S1 and S2, connected in the primary circuit of the power transformer.

3-22. Circuit Control

3-23. Bus transceivers U3 (for $\overline{DIO1}$-$\overline{DIO4}$) and U5 (for $\overline{DIO5}$-$\overline{DIO8}$) are set in either send or receive status by the condition of $\overline{TALKEN}$. When true, $\overline{TALKEN}$ will set these bus transceivers for transmission to the IEEE bus. With $\overline{TALKEN}$ false, U3 and U5 will receive addresses or data from the IEEE bus.

3-24. Pull up enable will also be applied to U3 and U5 from U7-8. The only exception to this case occurs when $\overline{EOI}$ and $\overline{ATN}$ are both false. Data sent to the bus will then be open-collector configured (occurs only when a controller executes a parallel poll sequence).

3-25. The condition of $\overline{ATN}$ will identify the information being received on IEEE bus lines $\overline{DIO1}$-$\overline{DIO8}$. When $\overline{ATN}$ is true, $\overline{DIO1}$-$\overline{DIO8}$ transfer address and command information. With $\overline{ATN}$ false, these lines are set for data transfer. Each Interface PCB Assembly is provided with drive for front panel talk and listen indicators by U8.

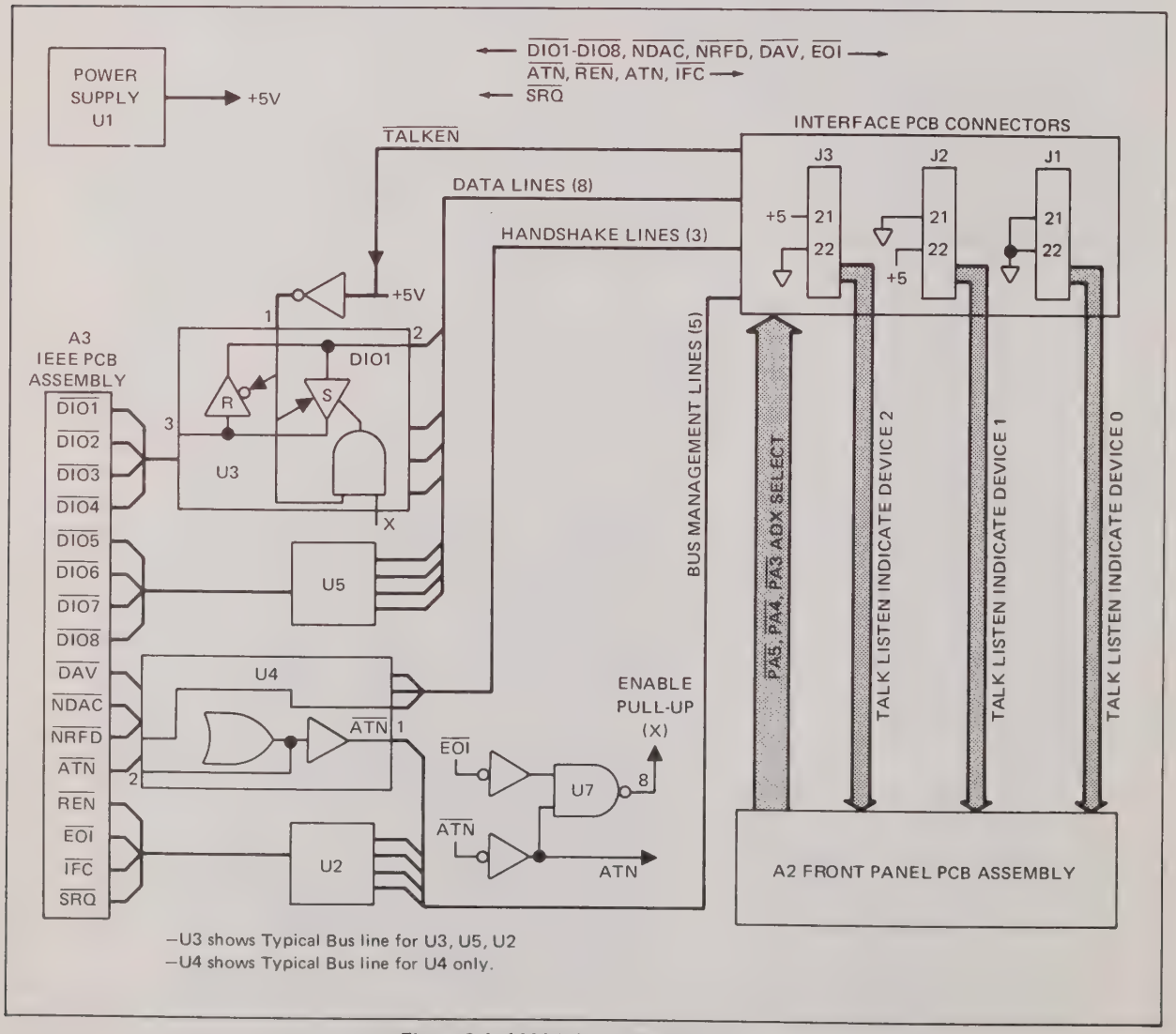

Figure 3-4. 1120A Simplified Schematic

Section 4
Maintenance

WARNING

THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

4-1. INTRODUCTION

4-2. This section of the manual provides information concerning warranty, general maintenance, performance testing and troubleshooting for the 1120A. Most troubleshooting and performance test procedures necessitate a system connection of the 1120A to a controlling device on the IEEE-488 bus and to a measurement instrument. Reference should therefore also be made to the instruction manual for the particular measurement instrument in use for more detailed troubleshooting and performance testing procedures than provided in this manual.

4-3. SERVICE INFORMATION

4-4. Each instrument manufactured by the John Fluke Mfg. Co., Inc. is warranted for a period of 1-year upon delivery to the original purchaser. The warranty terms are located at the front of the manual.

4-5. Factory authorized calibration and service for each Fluke product is available at various worldwide locations. A complete list of domestic service centers is located in Section 7 of this manual. Shipping information is given in Section 2. If requested, the customer will be provided an estimate before any work begins on instruments that are beyond the warranty period.

4-6. GENERAL MAINTENANCE

4-7. Line Voltage Selection

4-8. The 1120A contains two input voltage setting switches (S1 and S2). The two positions for either switch are identified by easily seen white or red markings. The factory line voltage setting will be indicated on the rear panel decal. Use the following procedure when verifying or changing the 1120A's line voltage setting:

1. Ensure that the line power cord is disconnected from the 1120A.

2. Remove the 1120A's top cover.

3. Locate input voltage selection switches, S1 and S2, immediately behind the power transformer (right rear corner of the Main PCB). Refer to Figure 4-1 for switch location and positioning.

4. If switch repositioning is necessary, slide each switch to the appropriate color-coded position as outlined in Figure 4-1. A small bladed screwdriver placed in the switch slot will aid in positioning.

4-9. Fuse Replacement

WARNING
DISCONNECT THE UNIT FROM LINE POWER BEFORE ATTEMPTING FUSE REPLACEMENT.

4-10. The 1120A has one fuse, accessible on the rear panel. Fuse values, depending on line voltage, are as follows:

VOLTAGE	FUSE
100V	AGC 1/4A
120V	AGC 1/4A
220V	AGC 1/8A
240V	AGC 1/8A

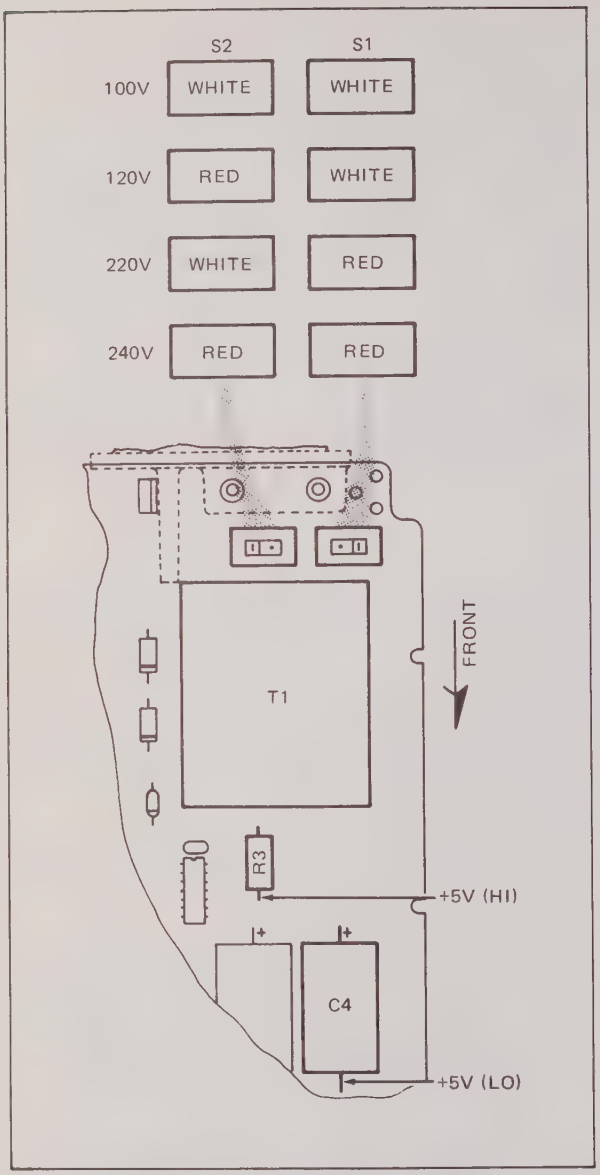

Figure 4-1. Maintenance Locations and Line Voltage Switching

4-11. Cleaning

4-12. Clean the 1120A periodically to remove dust, grease and other contamination. Use the following procedure:

CAUTION

Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These agents will react with plastic materials used in the manufacture of the 1120A.

1. Clean the front panel and case with a soft cloth dampened with a mild solution of detergent and water.

2. Clean the surface of the pcb's using clean, dry air at low pressure (≤20 psi). If grease is encountered, spray with Freon T.F. Degreaser or anhydrous alcohol and remove grime with clean, dry, low pressure air.

4-13. Instrument Disassembly

4-14. Use the following procedure when disassembling the 1120A IEEE-488 Translator:

1. Press power to STBY and remove the power cord.

2. On the bottom of the instrument, remove the four case securing screws.

3. To remove the Interface Assemblies or the IEEE Adapter Assembly, grasp them by the front and rear upper corners. While applying a gentle rocking action, lift the pcb free of its front connector and rear connector guide.

4. Remove the pcb securing screw from the center top of the Main PCB.

5. Lift the Main PCB, with front and rear panels attached, free of the lower case half.

4-15. Front Panel Assembly Removal

4-16. Use the following procedure to remove the Front Panel Assembly from the Main PCB:

1. Locate the two buttresses attached to the top back side of the pcb. Compress the buttress retaining clip while gently pulling the buttress backward. Disconnect both buttresses in a similar manner.

2. Remove the two retaining screws securing the front panel to the Front Panel PCB. It may be necessary to rotate one of the buttresses to access the right side screw.

3. Remove the front panel from the Front Panel PCB.

4. Carefully pry the Front Panel PCB up from the Main PCB connector and guide pins. Continue leverage, alternating between sides of the connector, until the Front Panel PCB disconnects.

4-17. Interface PCB Assembly Installation and Removal

4-18. Use the following procedure when installing or removing the Interface PCB Assemblies:

1. Ensure that the power switch is set to STBY. Disconnect the line cord.

2. Remove the 1120A's top cover.

3. Locate the Interface PCB Assembly positions on the Main PCB (left side). These positions are labeled IF0, IF1, and IF2 on the Main PCB, corresponding respectively to device 0, 1, and 2 as identified on the instrument's front panel.

4. Grasp the Interface PCB Assembly at both upper corners.

NOTE

Avoid touching circuitry on the Interface PCB Assembly.

5. Install the Interface PCB Assembly in the desired interface position. Ensure that the Assembly fits in the front panel guide slot, and that the grooved connector on the rear of the pcb fits into the rear panel guide.

6. Applying equal pressure at front and rear, press the Assembly into its jack on the Main PCB.

7. For removal, grasp the pcb at both upper corners and pull up. A gentle rocking motion may be necessary to disconnect the Interface PCB from its Main PCB jack.

8. Replace the 1120A's top cover.

4-19. PERFORMANCE TEST

4-20. The Performance Test for the 1120A entails system connections on the IEEE bus with a measurement instrument and a controlling instrument. This test verifies instrument performance to specifications and may be used for initial acceptance or as an aid in troubleshooting. Refer to PERFORMANCE TEST procedures included in the instruction manual for the associated measurement instrument.

4-21. Verification of power supply operation in the 1120A may be made in the following manner:

1. Disconnect the line power cord.

2. Remove the instrument's top cover.

3. Connect a Digital Voltmeter to R3 (front) (HI) and C4 (front) (LO). Refer to Figure 4-1 for location.

4. Apply power to the 1120A.

5. The measured voltage should be between 4.75V and 5.25V.

4-22. CALIBRATION

4-23. There are no calibration adjustments for the 1120A IEEE-488 Translator.

4-24. TROUBLESHOOTING

4-25. Troubleshooting for the 1120A consists of the tabular flow chart presented in Table 4-1. When a step in the flow chart is completed, check for a decision transfer. If no decision is required, perform the next step of the table in sequence.

4-26. Static discharge can damage components contained in the 1120A. The following precautions should be observed during troubleshooting or repair.

1. Never connect or disconnect pcb's or components without first pressing power to STBY and removing the line power cord.

2. Perform all repairs at a static-free work station.

3. Minimize handling of IC's and pcb's; in no case handle them by their connectors.

4. Keep repair parts in their original containers until ready for use.

5. Use static ground straps to discharge repair personnel.

6. Use conductive foam or antistatic containers to store replacement or removed IC's and pcb's.

7. Remove all plastic, vinyl and styrofoam products from the work area.

8. Do not slide static sensitive devices over any surface.

9. Use grounded tip soldering irons.

Table 4-1. 1120A Troubleshooting

STEP NO.	ACTION	Go to the step number given for correct response	
		YES	NO
1	Press power to STBY and remove power cord.		
2	Remove Interface PCB Assemblies.		
3	Set up ac input switches behind transformer for the available input supply voltage.		
4	Check for correct fuse value.		
5	Connect ac supply. Press power ON.		
6	With ground reference, check voltage at + terminal of cap C3.		
7	Is voltage 11.75 ± 2.0V?	18	
8	Is there a short to ground on + terminal at cap C3 or C4 (large electrolytic caps)?	9	11
9	Check for short to heatsink on series pass transistor Q1. Repair as required. Resume at step 6.		
10	Check for short in cap C3 or C4 (remove + lead to check short). Repair as required then resume at step 6.		
11	Recheck ac switch settings.		
12	Check for faulty rectifier diodes CR3 and CR2. Repair as required then resume at step 6.		
13	Check transformer secondaries at anodes of rectifying diodes CR3 and CR2. Is voltage 8.6 ± 1V ac?	14	
14	Check for faulty transformer and resume at step 6.		
15	Remove Q1.		
16	Is voltage on + terminal of C3 11.75 ± 2.0V?		9
17	Check Q1 for internal shorts. Replace if necessary and resume at step 6.		
18	Check voltage at center position of either pole of S2. Is the voltage 5.00 ± 0.25V dc?	28	19
19	Check voltage at + terminal of cap C1. Is the voltage 17.0 ± 3.5V dc?	23	20
20	Check for short on C1 or faulty rectifier CR1. If faulty component, replace and resume at step 3.		
21	Check transformer secondary voltage on anode of CR1 (small diode). Is the voltage 12.7 ± 2.5V ac?	23	22
22	Check for faulty transformer and resume at step 6.		
23	Check voltage at pin 5 of U1. Is voltage 5.0 ± 0.25V dc?	25	24
24	Replace U1 and resume at step 18.		
25	Check voltage at pin 2 of U1. Is voltage 5.0 ± 0.25V dc?	27	26
26	Replace Q1 and repeat step 25. If Q1 has been replace check C1 for short. If not shorted, replace U1.		
27	Check for short on 5V trace which connects the center position of S3. Repair and resume at step 25.		
28	Close power switch on front panel.		

Table 4-1. 1120A Troubleshooting (cont)

STEP NO.	ACTION	Go to the step number given for correct response	
		YES	NO
29	Check voltage on rearmost position of either pole of S2. Is voltage 5.0 ± 0.25V dc?	34	30
30	Turn off power, remove ac supply and check for shorts on 5V supply line.		
31	If no short is detected, reconnect power, turn unit on, and check voltage across R3. Is it < 0.6V?	32	33
32	Check for faulty power switch or broken lands on 5V supply. Resume at step 29.		
33	Power supply is current limiting. Check for shorts in and around U2, U3, U4, U5.		
34	This completes troubleshooting of 5V, section 1120A. Refer to applicable measurement instrument instruction manual for IEEE bus troubleshooting.		

Section 5
List of Replaceable Parts

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A2 Front Panel PCB Assembly	5-3	5-9	5-3	5-9
A3 IEEE PCB Assembly	5-4	5-10	5-4	5-10

5-1. INTRODUCTION

5-2. This section contains an illustrated parts breakdown of the 1120A. Components are listed alphanumerically by assembly. Both electrical and mechanical components are listed first by reference designation and second by item number. Each listed part is shown in an accompanying illustration.

5-3. Parts lists include the following information:

1. Reference Designation or Item Number.

2. Description of each part.

3. FLUKE Stock Number.

4. Federal Supply Code for Manufacturers. (See Section 7 for Code-to-Name list.)

5. Manufacturer's Part Number or Type.

6. Total Quantity per assembly or component.

7. Recommended Quantity: This entry indicates the recommended number of spare parts necessary to support one to five instruments for a period of two years. This list presumes an availability of common electronic parts at the maintenance site. For maintenance for 1-year or more at an isolated site, it is recommended that at least one of each assembly in the instrument be stocked. In the case of optional subassemblies, plug-ins, etc., that are not always part of the instrument, or are deviations from the basic instrument model, the REC QTY column lists the recommended quantity of the item in that particular assembly.

5-4. HOW TO OBTAIN PARTS

5-5. Components may be ordered directly from the manufacturer by using the manufacturer's part number, or from the John Fluke Mfg. Co., Inc. factory or authorized representative by using the FLUKE STOCK NUMBER. In the event the part you order has been replaced by a new or improved part, the replacement will be accompanied by an explanatory note and installation instructions, if necessary.

5-6. To ensure prompt and efficient handling of your order, include the following information.

1. Quantity.

2. FLUKE Stock Number.

3. Description.

4. Reference Designation or Item Number.

5. Printed Circuit Board Part Number.

6. Instrument Model and Serial Number.

CAUTION

Indicated devices are subject to damage by static discharge.

Table 5-1. 1120A Final Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
	FINAL ASSY, 1120A IEEE-488 TRANSLATOR						
A1	Ⓟ MAIN PCB ASSY (1120A-4001T)	476432	89536	476432	1		
A2	FRONT PANEL PCB ASSY (1120A-4002T)	476499	89536	476499	1		
A3	IEEE PCB ASSY (1120A-4003T)	476465	89536	476465	1		
F1	FUSE	109314	71400	AGCI-4	1		
H1	SCREW 4-40 X 1/2	152132	73734	19026	1		
H2	WASHER, SHOULDER	485417	86928	5607-50	1		
H3	SCREW, 6-32 X 3/8	485227	89536	485227	6		
H4	BUSHING, INSULATED	488429	89536	488429	1		
H5	NUT, 4-40	110635	73734	8003NP	1		
H6	WASHER	175943	89536	175943	1		
H7	WASHER	110395	89536	110395	1		
H8	SCREW, 4-40 X 1/2	256172	73734	23026	2		
H9	SCREW, 6-32 X 3/8	177022	89536	177022	2		
H10	SCREW, KEPS, 7-64	152819	78187	511-310110	4		
H11	WASHER	110395	89536	110395	2		
H12	SCREW, 6-20 X 5/8	288266	89536	288266	1		
H13	SCREW, FHP, 6-32 X 5/8	114876	89536	114876	1		
H14	SCREW, FHP, 6-32 X 1/2	114397	89536	114397	1		
H15	NUT, SELFLOCK, 6-32	152819	89536	152819	1		
MP1	PANEL REAR	476515	89536	476515	1		
MP2	TUBING, HEAT SHRINK	113852	92194	FIT221-3/16	1		
MP3	DECAL, FUSE (NOT SHOWN)	496141	89536	496141	1		
MP4	FRONT PANEL	483024	89536	476481	1		
MP5	LABEL, WARNING	386280	89536	386280	1		
MP6	BUTTRESS	481796	89536	481796	2		
MP7	BASE, PTI, STD.	454702	89536	454702	1		
MP8	FOOT, RUBBER	467571	89536	467571	4		
MP9	LATCH, PTI	467548	89536	467548	2		
MP10	BALE, PTI	467555	89536	467555	1		
MP11	BUTTON, SWITCH	486498	89536	486498	1		
MP12	COVER, SLOT	490698	89536	490698	1		
MP13	DECAL	483040	89536	483040	1		
MP14	COVER	454736	89536	454736	1		
MP15	HANDLE	454751	89536	454751	1		
MP16	RETAINER, HANDLE	467563	89536	467563	1		
MP17	DECAL, RETAINER	473645	89536	473645	1		
MP18	DECAL, BASE SIDES	473652	89536	473652	2		
Q1	XSTR, SI, NPN, PWR	325751	09214	D44C5	1		
T1	XFMR	486522	89536	486522	1		
W1	LINE CORD (NOT SHOWN)	343723	89536	343723	1		
XF1	FUSE HOLDER	460329	89536	460329	1		
XF1-1	FUSE COVER	460238	89536	460238	1		
XQ1	HEAT SINK	473868	89536	473868	1		

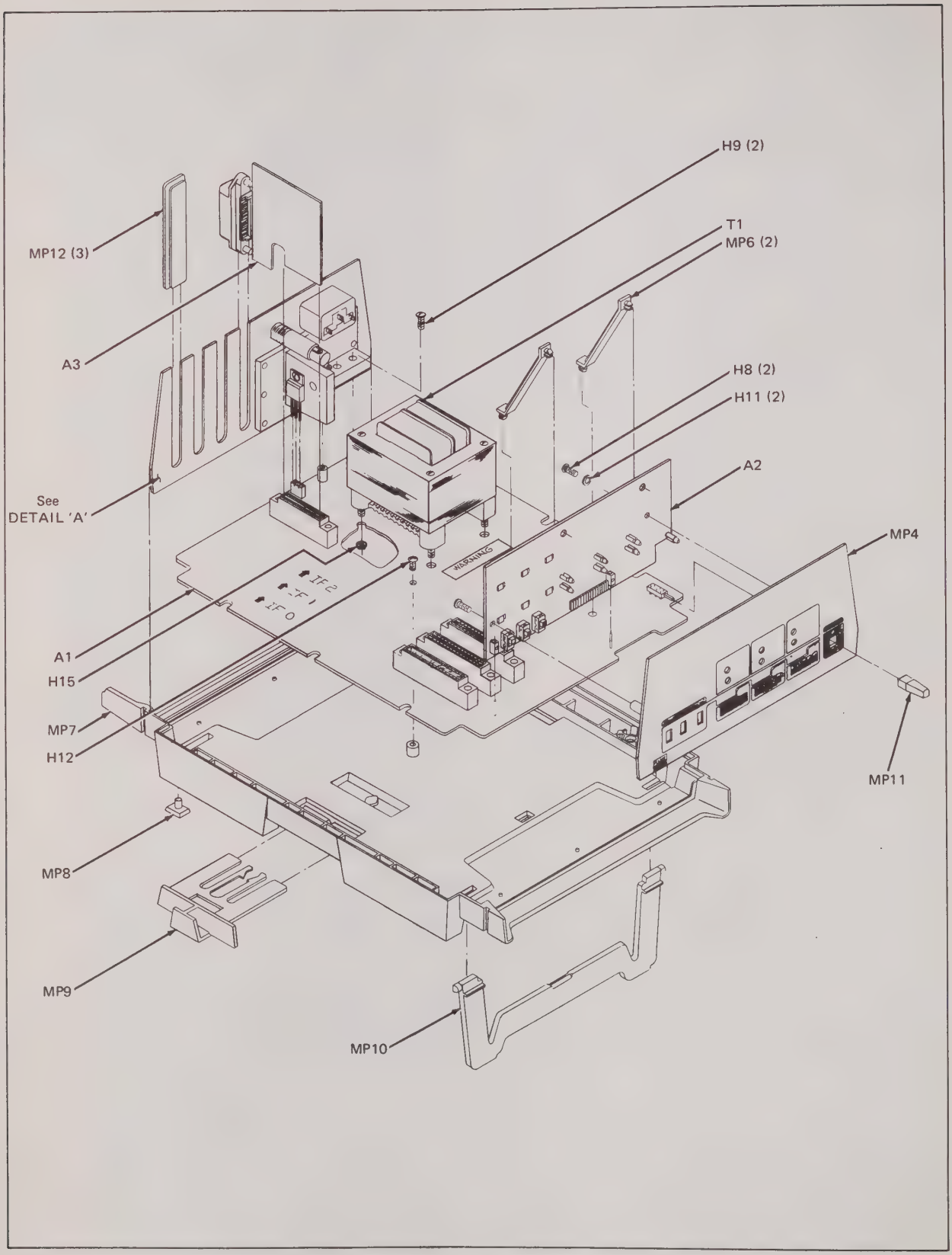

Figure 5-1. 1120A Final Assembly

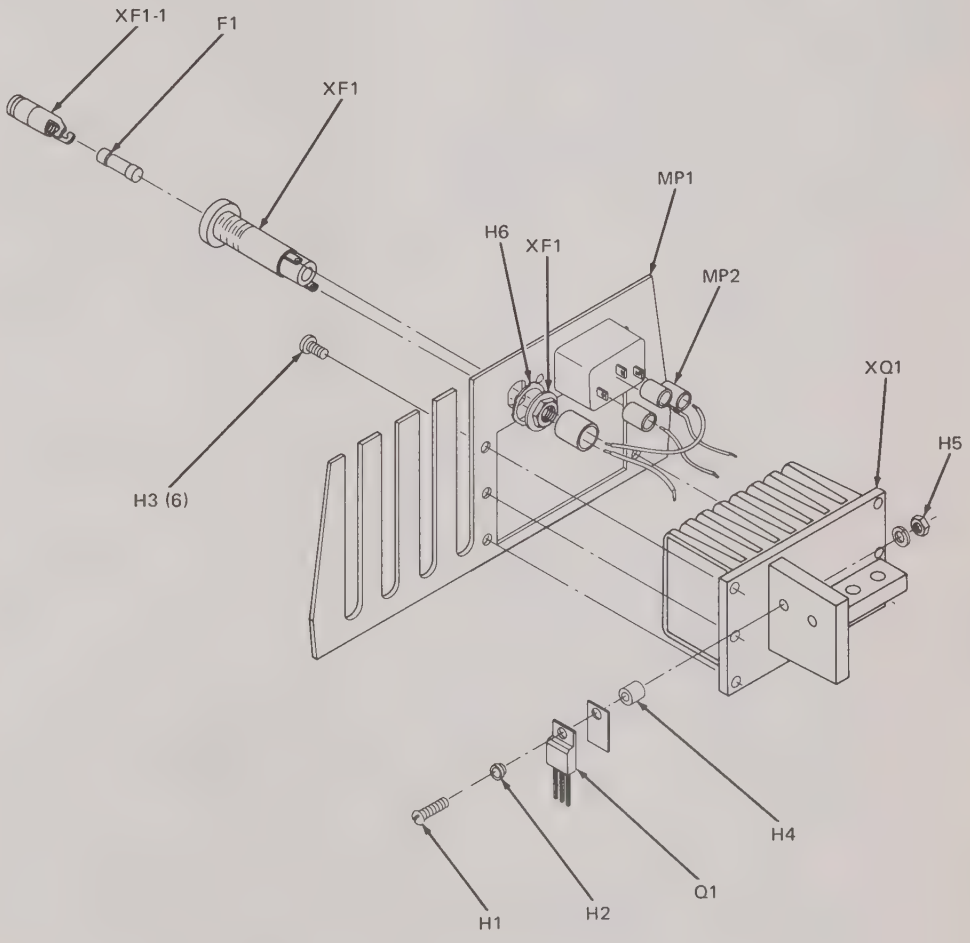

Figure 5-1. 1120A Final Assembly (cont)

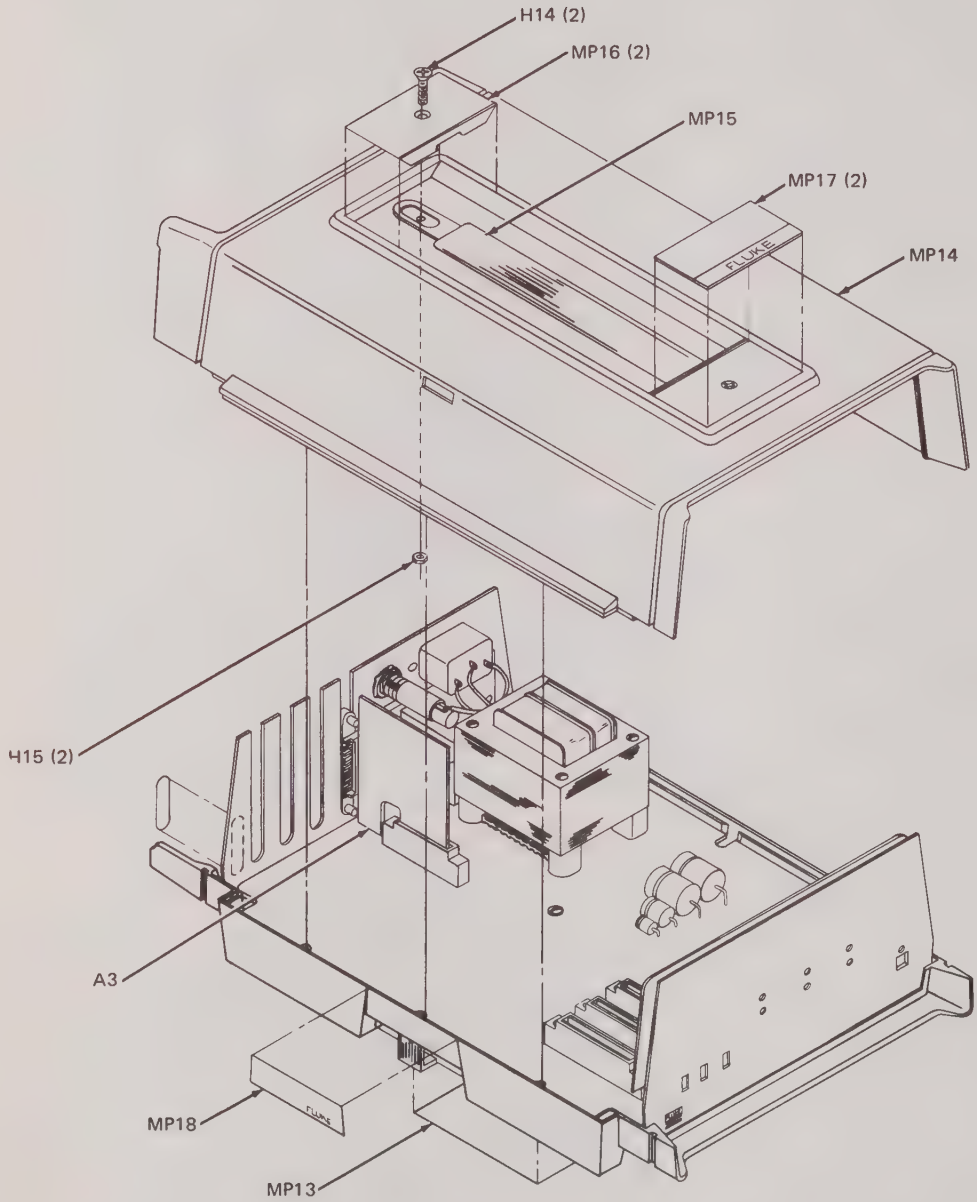

Figure 5-1. 1120A Final Assembly (cont)

Table 5-2. A1 Main PCB Assembly

ITEM NO.		DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A1	Ⓐ	MAIN PCB ASSY (1120A-4001)						
C1		CAP, ELECT, 680 UF -10/+50%, 25V	218172	80031	ET681X025A02	1	1	
C2		CAP, CER, 0.01 UF +/-20%, 100V	149153	56289	C023B101F103M	3		
C3		CAP, ELECT, 4700 UF -10/+100%, 15V	379370	80031	3050HJ472U015	2	1	
C4		CAP, ELECT, 4700 UF -10/+100%, 15V	379370	80031	3050HJ472U015	REF		
C5		CAP, ELECT, 150 UF -10/+50%, 16V	186296	80031	ET151X016A5	1	1	
C6		CAP, CER, 0.01 UF +/-20%, 100V	149153	56289	C023B101F103M	REF		
C7		CAP, CER, 0.01 UF +/-20%, 100V	149153	56289	C023B101F103M	REF		
C8		CAP, CER, 1200PF +/-10%, 500V	106732	71590	CF122	1		
CR1		DIODE, SI, RECT, 1 AMP	343491	01295	1N4002	1	1	
CR2		DIODE, SI, RECT, 2 AMP	347559	05277	1N5400	2	1	
CR3		DIODE, SI, RECT, 2 AMP	347559	05277	1N5400	REF		
H1		GUIDE PIN	375840	89536	375840	2		
J1		CONNECTOR, 30-PIN	484253	09922	ETBH4DD10-8	3		
J2		CONNECTOR, 30-PIN	484253	09922	ETBH4DD10-8	REF		
J3		CONNECTOR, 30-PIN	484253	09922	ETBH4DD10-8	REF		
J4		PIN AMP	376574	00779	3-87022-1	12		
J5		CONNECTOR, 20-PIN	484162	09922	ETBH4DD15-8	1		
MP1		MOUSE TAIL	104794	98159	2829-115-3	1		
R1		RES, MF, 2.15K +/-1%, 1/8W	293712	91637	CMF552151F	1		
R2		RES, MF, 4.99K +/-1%, 1/8W	168252	91637	CMF554991F	1		
R3		RES, WW, 0.33 +/-5%, 2W	219402	89536	219402	1		
R4		RES, DEP CAR, 1.5K +/-5%, 1/4W	343418	80031	DR251-4-5P1K5T	1		
R15		RES, DEP CAR, 10 +/-5%, 1/4W	441683	73445	CR251-45P10E	1		
RN1		RES NETWORK	412908	89536	412908	1	1	
RN2		RES NETWORK	484600	89536	484600	1	1	
RN3		RES NETWORK	414003	89536	414003	1	1	
S1		SWITCH	234278	82389	XW1649	2	1	
S2		SWITCH	234278	82389	XW1649	REF		
S3		SWITCH ASSY	473736	89536	473736	1		
U1		IC, LIN VOL REGULATOR	379420	04713	MC1723CL	1	1	
U2		IC, DGTL, QUAD, THREE-STALE BUS, XCEIVER	453480	04713	XC3448P	3	1	
U3		IC, DGTL, QUAD, THREE-STALE BUS, XCEIVER	453480	04713	XC3448P	REF		
U4		IC, DGTL,QUAD INTERFACE, BUS TRANSCEIVER	428649	04713	MC3446P	1	1	
U5		IC, DGTL, QUAD, THREE-STALE BUS, XCEIVER	453480	04713	XC3448P	REF		
U6		IC, TTL, HEX INVERTER, POS NAND GATES	393058	01295	SN74LS04	1	1	
U7		IC, TTL, QUAD 2-INPUT POS NAND GATES	394205	01295	SN74LS03	1	1	
U8	Ⓐ	IC, C-MOS, HEX INVTR/BUFFERS	381830	04713	MC14050CP	1	1	
X1		SOCKET, 3-PIN	402958	09922	DILB-28P-108	1		

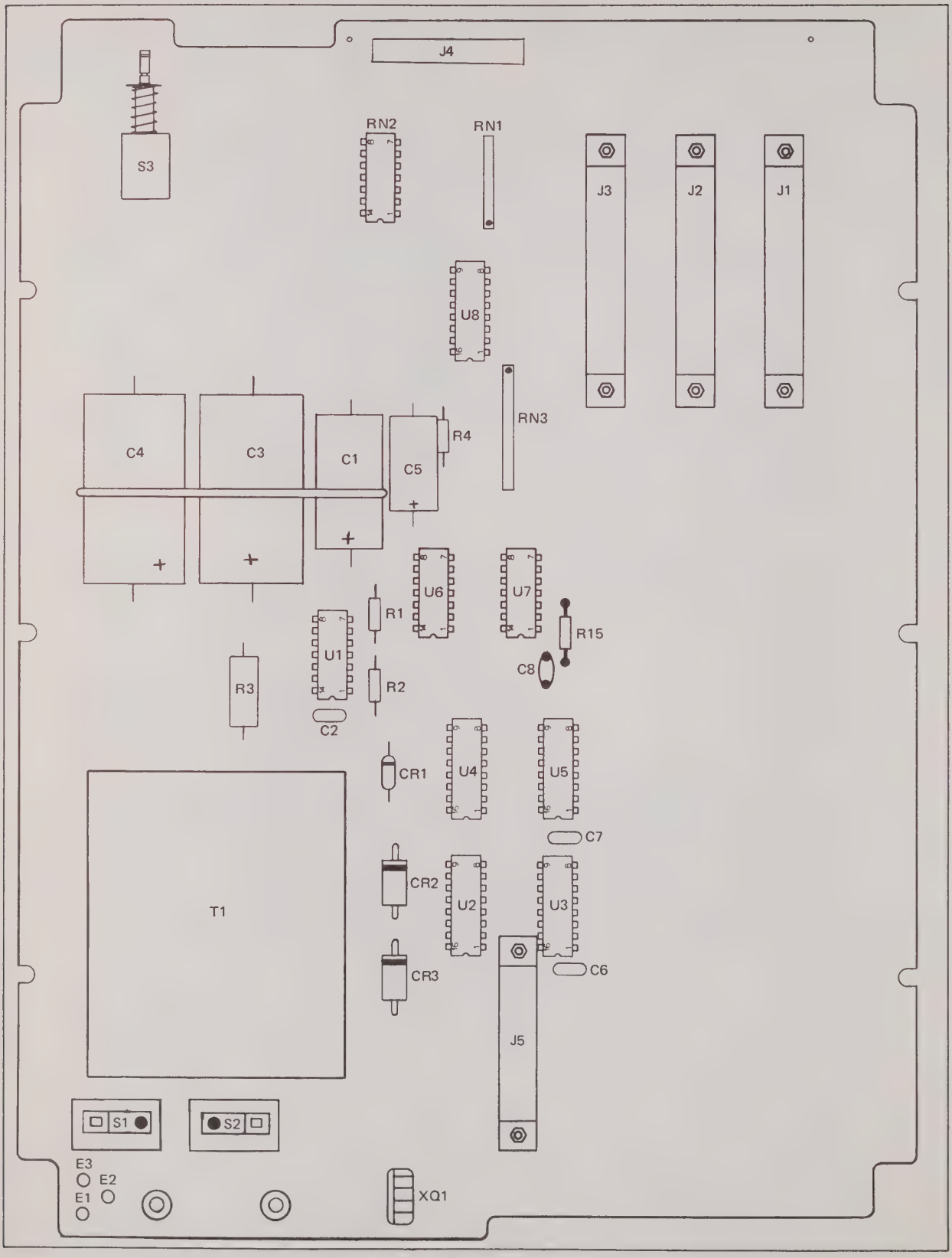

Figure 5-2. A1 Main PCB Assembly

Table 5-3. A2 Front Panel PCB Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A2	FRONT PANEL PCB ASSY (1120A-4002)						
CR1	LED	369777	28480	5082-4480	7	2	
CR2	LED	369777	28480	5082-4480	REF		
CR3	LED	369777	28480	5082-4480	REF		
CR4	LED	369777	28480	5082-4480	REF		
CR5	LED	369777	28480	5082-4480	REF		
CR6	LED	369777	28480	5082-4480	REF		
CR7	LED	369777	28480	5082-4480	REF		
MP1	CARD GUIDE	298836	89536	S98836	3		
MP2	LED SPACER, RED	471094	89536	471094	7		
P4	AMP PIN RECPT	375329	00779	85863-3	12		
S1	SWITCH, SLIDE, SPDT	429332	09353	1101-M2-C-Q	3		
S2	SWITCH, SLIDE, SPDT	429332	09353	1101-M2-C-Q	REF		
S3	SWITCH, SLIDE, SPDT	429332	09353	1101-M2-C-Q	REF		
X1	PIN GUIDE, SOCKET	149112	74970	105-0753	REF		
X2	PIN GUIDE, SOCKET	149112	74970	105-0753	REF		

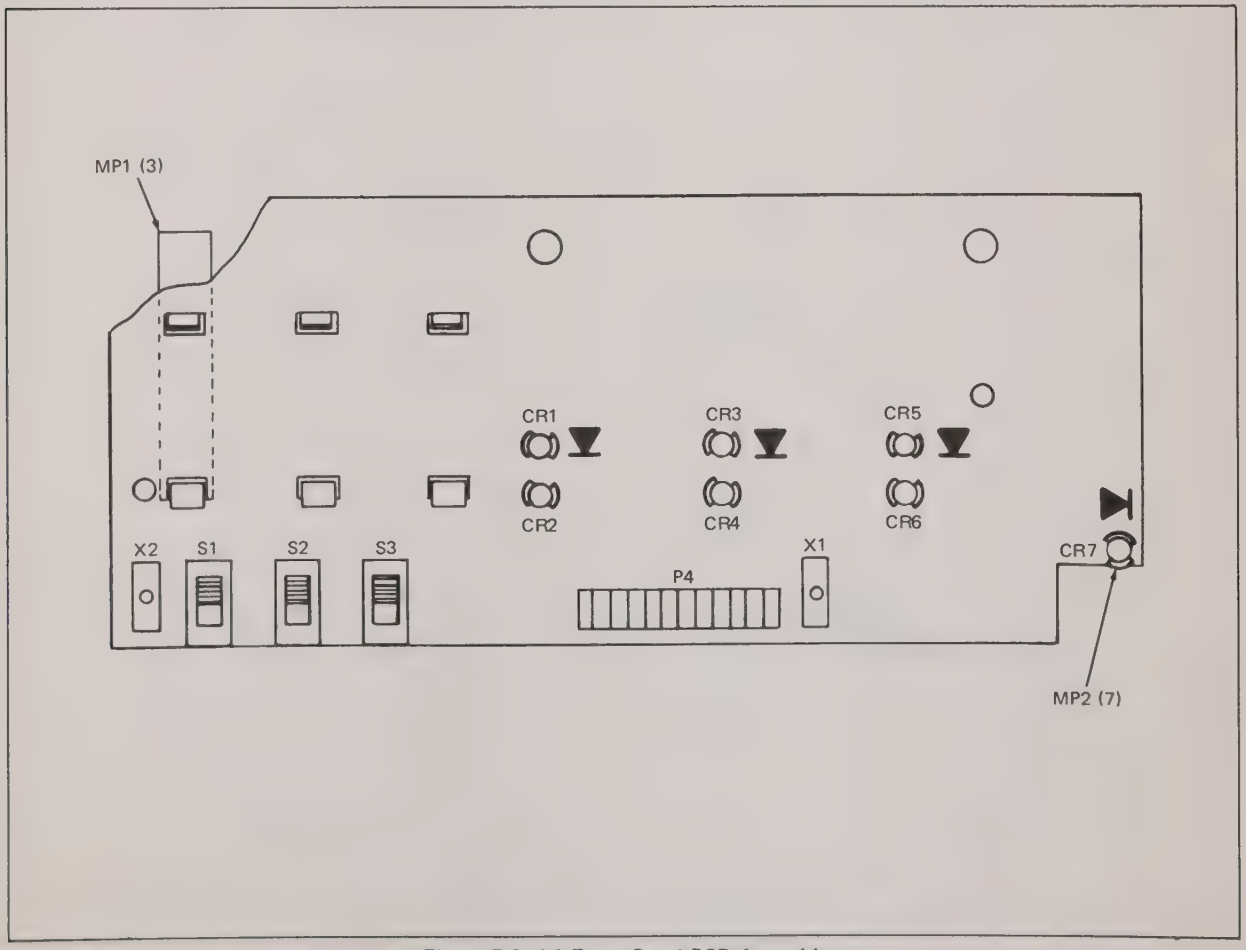

Figure 5-3. A2 Front Panel PCB Assembly

Table 5-4. A3 IEEE PCB Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A3	IEEE PCB ASSY (1120A-4003)						
H1	SCREW, CONNECTOR MTG.	429472	89536	429472	2		
H2	NUT, HEX 6-32	110569	73734	70206	2		
H3	LOCK WASHER, SPLIT	110692	89536	110692	2		
H4	WASHER, FLAT	111054	89536	111054	2		
J1	CONNECTOR, 24-PIN	484220	00779	552230-1	1		

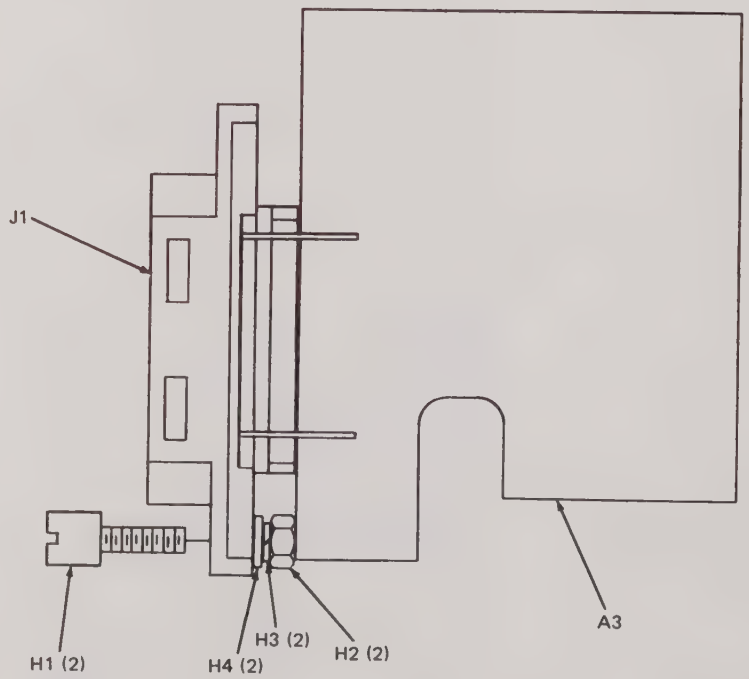

Figure 5-4. A3 IEEE PCB Assembly

Section 6
Option & Accessory Information

TABLE OF CONTENTS

	TITLE	PAGE
6-1	INTRODUCTION	6-2
6-3	ACCESSORY INFORMATION	6-2

OPTION/ MODEL NO.	DESCRIPTION	PAGE
	ACCESSORIES	600-1

6-1. INTRODUCTION

6-2. This section will contain information necessary to install, operate and maintain any accessories or options available for the Model 1120A IEEE-488 Translator.

6-3. ACCESSORY INFORMATION

6-4. This subsection, identified by a 600-X numbering format, details all accessories available for the 1120A. These accessories are listed in Table 6-1.

Table 6-1. Accessories

MODEL NO.	DESCRIPTION
Y2014	C Size Single Unit Offset Rack Mount
Y2015	C Size Dual Unit Rack Mount
Y2020	C Size Panel Mount
Y7202	Instrument Cable, 2 ft.
Y7203	Instrument Cable, 5 ft.
Y8001	IEEE Standard Cable, 1 Meter
Y8002	IEEE Standard Cable, 2 Meter
Y8003	IEEE Standard Cable, 4 Meter

Accessories

600-1. INTRODUCTION

600-2. Table 6-1, contains a list of accessories available for use with the Model 1120A IEEE-488 Translator. The following paragraphs contain descriptions for each type of accessory. The accessory model number should be used when ordering.

600-3. MOUNTING KITS

600-4. Mounting kits suited for the Portable Test Instrument (PTI) case used with the 1120A are available for standard 19-inch rack or panel format. Each kit comes complete with all mounting hardware. Model Y2014 provides for mounting a single PTI case (size "C") in a 19-inch rack. Model Y2015 mounts two PTI cases ("C") in a 19-inch rack. Model Y2020 mounts a single PTI "C" case in a panel arrangement.

600-6. IEEE CABLES

600-7. IEEE cables, as seen in Figure 600-1, are available in three lengths. These cables, attachable to the IEEE Adapter Assembly connector in the middle of the 1120A rear panel, can be stacked to allow a variety of interconnections (more than one cable can be attached to one device). Each cable features standard IEEE 24-pin connectors (both ends); refer to Figure 600-1 for pin location and identification. Available model numbers are: Y8001 (1 meter), Y8002 (2 meters), and Y8003 (4 meters). The maximum length of cable that can be used to connect a group of devices is: 2 meters times the number of devices with a bus system, or 20 meters, whichever is less. Each connector is equipped with metric-threaded securing screws.

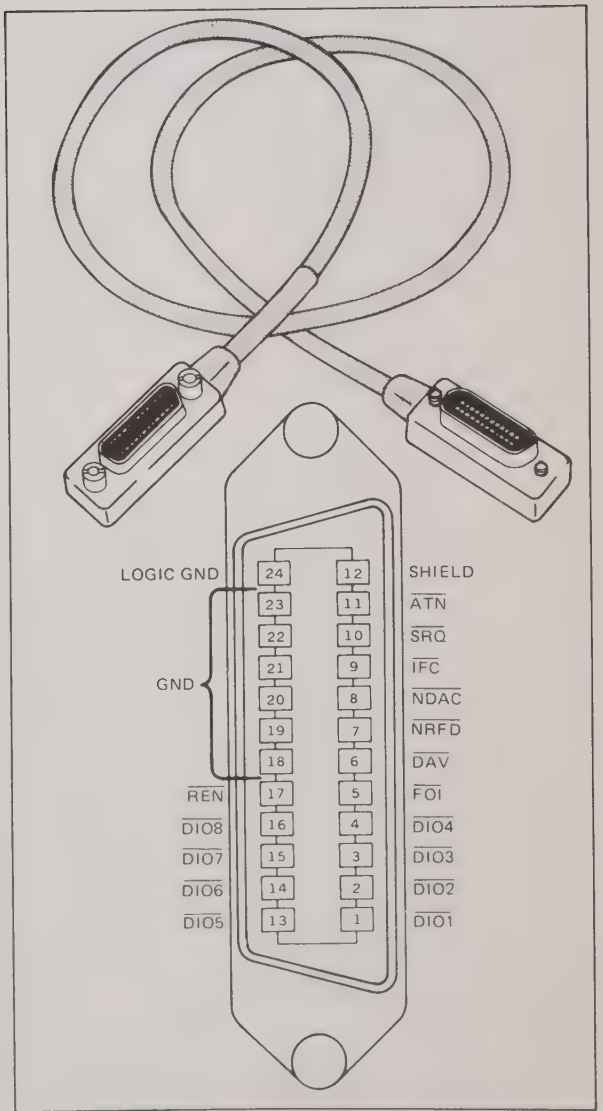

Figure 600-1. IEEE Cable and Pin Identification

Section 7

General Information

7-1. This section of the manual contains generalized user information as well as supplemental information to the List of Replaceable Parts contained in Section 5.

List of Abbreviations and Symbols

A or amp	ampere
ac	alternating current
af	audio frequency
a/d	analog-to-digital
assy	assembly
AWG	american wire gauge
B	bel
bcd	binary coded decimal
°C	Celsius
cap	capacitor
ccw	counterclockwise
cer	ceramic
cermet	ceramic to metal(seal)
ckt	circuit
cm	centimeter
cmrr	common mode rejection ratio
comp	composition
cont	continue
crt	cathode-ray tube
cw	clockwise
d/a	digital-to-analog
dac	digital-to-analog converter
dB	decibel
dc	direct current
dmm	digital multimeter
dvm	digital voltmeter
elect	electrolytic
ext	external
F	farad
°F	Fahrenheit
FET	Field-effect transistor
ff	flip-flop
freq	frequency
FSN	federal stock number
g	gram
G	giga (10^9)
gd	guard
Ge	germanium
GHz	gigahertz
gmv	guaranteed minimum value
gnd	ground
H	henry
hd	heavy duty
hf	high frequency
Hz	hertz
IC	integrated circuit
if	intermediate frequency
in	inch(es)
intl	internal
I/O	input/output
k	kilo (10^3)
kHz	kilohertz
kΩ	kilohm(s)
kV	kilovolt(s)
lf	low frequency
LED	light-emitting diode
LSB	least significant bit
LSD	least significant digit
M	mega (10^6)
m	milli (10^{-3})
mA	milliampere(s)
max	maximum
mf	metal film
MHz	megahertz
min	minimum
mm	millimeter
ms	millisecond
MSB	most significant bit
MSD	most significant digit
MTBF	mean time between failures
MTTR	mean time to repair
mV	millivolt(s)
mv	multivibrator
MΩ	megohm(s)
n	nano (10^{-9})
na	not applicable
NC	normally closed
(–) or neg	negative
NO	normally open
ns	nanosecond
opnl ampl	operational amplifier
p	pico (10^{-12})
para	paragraph
pcb	printed circuit board
pF	picofarad
pn	part number
(+) or pos	positive
pot	potentiometer
p-p	peak-to-peak
ppm	parts per million
PROM	programmablle read-only memory
psi	pound-force per square inch
RAM	random-access memory
rf	radio frequency
rms	root mean square
ROM	read-only memory
s or sec	second (time)
scope	oscilloscope
SH	shield
Si	silicon
serno	serial number
sr	shift register
Ta	tantalum
tb	terminal board
tc	temperature coefficient or temperature compensating
tcxo	temperature compensated crystal oscillator
tp	test point
u or μ	micro (10^{-6})
uhf	ultra high frequency
us or μs	microsecond(s) (10^{-6})
uut	unit under test
V	volt
v	voltage
var	variable
vco	voltage controlled oscillator
vhf	very high frequency
vlf	very low frequency
W	watt(s)
ww	wire wound
xfmr	transformer
xstr	transistor
xtal	crystal
xtlo	crystal oscillator
Ω	ohm(s)
μ	micro (10^{-6})

Federal Supply Codes for Manufacturers

00213
Nytronics Comp. Group Inc.
Subsidiary of Nytronics Inc.
Formerly Sage Electronics
Rochester, New York

00327
Welwyn International, Inc.
Westlake, Ohio

00656
Aerovox Corp.
New Bedford, Massachusetts

00686
Film Capacitors, Inc.
Passaic, New Jersey

00779
AMP Inc.
Harrisburg, Pennsylvania

01121
Allen-Bradley Co.
Milwaukee, Wisconsin

01281
TRW Electronic Comp.
Semiconductor Operations
Lawndale, California

01295
Texas Instruments, Inc.
Semiconductor Group
Dallas, Texas

01537
Motorola Communications &
Electronics Inc.
Franklin Park, Illinois

01686
RCL Electronics Inc.
Manchester, New Hampshire

01730
Replaced by 73586

01884
Use 56289
Sprague Electric Co.
Dearborn Electronic Div.
Lockwood, Florida

02114
Ferroxcube Corp.
Saugerties, New York

02131
General Instrument Corp.
Harris ASW Div.
Westwood, Maine

02395
Rason Mfg. Co.
Brooklyn, New York

02533
Snelgrove, C.R. Co., Ltd.
Don Mills, Ontario, Canada
M3B 1M2

02606
Fenwal Labs
Div. of Travenal Labs.
Morton Grove, Illinois

02660
Bunker Ramo Corp., Conn Div.
Formerly Amphenol-Borg
Electric Corp.
Broadview, Illinois

02799
Areo Capacitors, Inc.
Chatsworth, California

03508
General Electric Co.
Semiconductor Products
Syracuse, New York

03614
Replaced by 71400

03651
Replaced by 44655

03797
Eldema Div.
Genisco Technology Corp.
Compton, California

03877
Transistron Electronic Corp.
Wakefield, Massachusetts

03888
KDI Pyrofilm Corp.
Whippany, New Jersey

03911
Clairex Electronics Div.
Clairex Corp.
Mt. Vernon, New York

03980
Muirhead Inc.
Mountainside, New Jersey

04009
Arrow Hart Inc.
Hartford, Connecticut

04062
Replaced by 72136

04202
Replaced by 81312

04217
Essex International Inc.
Wire & Cable Div.
Anaheim, California

04221
Aemco, Div. of
Midtex Inc.
Mankato, Minnesota

04222
AVX Ceramics Div.
AVX Corp.
Myrtle Beach, Florida

04423
Telonic Industries
Laguna Beach, California

04645
Replaced by 75376

04713
Motorola Inc. Semiconductor
Products
Phoenix, Arizona

04946
Standard Wire & Cable
Los Angeles, California

05082
Replaced by 94988

05236
Jonathan Mfg. Co.
Fullerton, California

05245
Components Corp. now
Corcom, Inc.
Chicago, Illinois

05277
Westinghouse Electric Corp.
Semiconductor Div.
Youngwood, Pennsylvania

05278
Replaced by 43543

05279
Southwest Machine &
Plastic Co.
Glendora, California

05397
Union Carbide Corp.
Materials Systems Div.
New York, New York

05571
Use 56289
Sprague Electric Co.
Pacific Div.
Los Angeles, California

05574
Viking Industries
Chatsworth, California

05704
Replaced by 16258

05820
Wakefield Engineering Inc.
Wakefield, Massachusetts

06001
General Electric Co.
Electronic Capacitor &
Battery Products Dept.
Columbia, South Carolina

06136
Replaced by 63743

06383
Panduit Corp.
Tinley Park, Illinois

06473
Bunker Ramo Corp.
Amphenol SAMS Div.
Chatsworth, California

06555
Beede Electrical Instrument Co.
Penacook, New Hampshire

06739
Electron Corp.
Littleton, Colorado

06743
Clevite Corp.
Cleveland, Ohio

06751
Components, Inc. Semcor Div.
Phoenix, Arizona

06860
Gould Automotive Div.
City of Industry, California

06961
Vernitron Corp., Piezo
Electric Div.
Formerly Clevite Corp., Piezo
Electric Div.
Bedford, Ohio

06980
Eimac Div.
Varian Associates
San Carlos, California

07047
The Ross Milton Co.
South Hampton, Pennsylvania

07115
Replaced by 14674

07138
Westinghouse Electric Corp.,
Electronic Tube Div.
Horsehead, New York

07233
TRW Electronic Components
Cinch Graphic
City of Industry, California

07256
Silicon Transistor Corp.
Div. of BBF Group Inc.
Chelmsford, Massachusetts

07261
Aumet Corp.
Culver City, California

07263
Fairchild Semiconductor
Div. of Fairchild Camera
& Instrument Corp.
Mountain View, California

07344
Bircher Co., Inc.
Rochester, New York

07597
Burndy Corp.
Tape/Cable Div.
Rochester, New York

07792
Lerma Engineering Corp.
Northampton, Massachusetts

07910
Teledyne Semiconductor
Formerly Continental Device
Hawthorne, California

07933
Use 49956
Raytheon Co.
Semiconductor Div. HQ
Mountain View, California

08225
Industro Transistor Corp.
Long Island City, New York

Federal Supply Codes for Manufacturers (cont)

08261
Spectra Strip Corp.
Garden Grove, California

08530
Reliance Mica Corp.
Brooklyn, New York

08806
General Electric Co.
Miniature Lamp Products Dept
Cleveland, Ohio

08863
Nylomatic Corp.
Norrisville, Pennsylvania

08988
Use 53085
Skottie Electronics Inc.
Archbald, Pennsylvania

09214
G.E. Co. Semi-Conductor
Products Dept.
Power Semi-Conductor
Products OPN Sec.
Auburn, New York

09353
C and K Components
Watertown, Massachusetts

09423
Scientific Components, Inc.
Santa Barbara, California

09922
Burndy Corp.
Norwalk, Connecticut

09969
Dale Electronics Inc.
Yankton, S. Dakota

10059
Barker Engineering Corp.
Formerly Amerace, Amerace
ESNA Corp.
Kenilworth, New Jersey

11236
CTS of Berne
Berne, Indiana

11237
CTS Keene Inc.
Paso Robles, California

11358
CBS Electronic Div.
Columbia Broadcasting System
Newburyport, Minnesota

11403
Best Products Co.
Chicago, Illinois

11503
Keystone Columbia Inc.
Warren, Michigan

11532
Teledyne Relays
Hawthorne, California

11711
General Instrument Corp.
Rectifier Division
Hicksville, New York

11726
Qualidyne Corp.
Santa Clara, California

12014
Chicago Rivet & Machine Co.
Bellwood, Illinois

12040
National Semiconductor Corp.
Danburry, Connecticut

12060
Diodes, Inc.
Chatsworth, California

12136
Philadelphia Handle Co.
Camden, New Jersey

12300
Potter-Brumfield Div.
AMF Canada LTD.
Guelph, Ontario, Canada

12323
Presin Co., Inc.
Shelton, Connecticut

12327
Freeway Corp. formerly
Freeway Washer & Stamping Co.
Cleveland, Ohio

12443
The Budd Co. Polychem Products
Plastic Products Div.
Bridgeport, Pennsylvania

12615
U.S. Terminals Inc.
Cincinnati, Ohio

12617
Hamlin Inc.
Lake Mills, Wisconsin

12697
Clarostat Mfg. Co.
Dover, New Hampshire

12749
James Electronics
Chicago, Illinois

12856
Micrometals
Sierra Madre, California

12954
Dickson Electronics Corp.
Scottsdale, Arizona

12969
Unitrode Corp.
Watertown, Massachusetts

13103
Thermalloy Co., Inc.
Dallas, Texas

13327
Solitron Devices Inc.
Tappan, New York

13511
Amphenol Cadre Div.
Bunker-Ramo Corp.
Los Gatos, California

13606
Use 56289
Sprague Electric Co.
Transistor Div.
Concord, New Hampshire

13839
Replaced by 23732

14099
Semtech Corp.
Newbury Park, California

14140
Edison Electronic Div.
Mc Gray-Edison Co.
Manchester, New Hampshire

14193
Cal-R-Inc. formerly
California Resistor, Corp.
Santa Monica, California

14298
American Components, Inc.
an Insilco Co.
Conshohocken, Pennsylvania

14655
Cornell-Dublier Electronics
Division of Federal Pacific
Electric Co. Govt. Control Dept.
Newark, New Jersey

14752
Electro Cube Inc.
San Gabriel, California

14869
Replaced by 96853

14936
General Instrument Corp.
Semi Conductor Products Group
Hicksville, New York

15636
Elec-Trol Inc.
Saugus, California

15801
Fenwal Electronics Inc.
Div. of Kidde Walter and Co., Inc.
Framingham, Massachusetts

15818
Teledyne Semiconductors,
formerly Amelco Semiconductor
Mountain View, California

15849
Litton Systems Inc. Useco Div.
formerly Useco Inc.
Van Nuys, California

15898
International Business
Machines Corp.
Essex Junction, Vermont

15909
Replaced by 14140

16258
Space-Lok Inc.
Burbank, California

16299
Corning Glass
Electronic Components Div.
Raleigh, North Carolina

16332
Replaced by 28478

16473
Cambridge Scientific Ind.
Div. of Chemed Corporation
Cambridge, Maryland

16742
Paramount Plastics
Fabricators, Inc.
Downey, California

16758
Delco Electronics
Div. of General Motors Corp.
Kokomo, Indiana

17001
Replaced by 71468

17069
Circuit Structures Lab.
Burbank, California

17338
High Pressure Eng. Co., Inc.
Oklahoma City, Oklahoma

17545
Atlantic Semiconductors, Inc.
Asbury Park, New Jersey

17856
Siliconix, Inc.
Santa Clara, California

17870
Replaced by 14140

18178
Vactec Inc.
Maryland Heights, Missouri

18324
Signetics Corp.
Sunnyvale, California

18612
Vishay Resistor Products Div.
Vishay Intertechnology Inc.
Malvern, Pennsylvania

18736
Voltronics Corp.
Hanover, New Jersey

18927
GTE Sylvania Inc.
Precision Material Group
Parts Division
Titusville, Pennsylvania

19451
Perine Machinery & Supply Co.
Seattle, Washington

19701
Electro-Midland Corp.
Mepco-Electra Inc.
Mineral Wells, Texas

20584
Enochs Mfg. Inc.
Indianapolis, Indiana

Federal Supply Codes for Manufacturers (cont)

20891
Self-Organizing Systems, Inc.
Dallas, Texas

21604
Bucheye Stamping Co.
Columbus, Ohio

21845
Solitron Devices Inc.
Transistor Division
Riveria Beach, Florida

22767
ITT Semiconductors
Palo Alto, California

23050
Product Comp. Corp.
Mount Vernon, New York

23732
Tracor Inc.
Rockville, Maryland

23880
Stanford Applied Engrng.
Santa Clara, California

23936
Pamotor Div., Wm. J. Purdy Co.
Burlingame, California

24248
Replaced by 94222

24355
Analog Devices Inc.
Norwood, Massachusetts

24655
General Radio
Concord, Massachusetts

24759
Lenox-Fugle Electronics Inc.
South Plainfield, New Jersey

25088
Siemen Corp.
Isilen, New Jersey

25403
Amperex Electronic Corp.
Semiconductor &
Micro-Circuits Div.
Slatersville, Rhode Island

27014
National Semiconductor Corp.
Santa Clara, California

27264
Molex Products
Downers Grove, Illinois

28213
Minnesota Mining & Mfg. Co.
Consumer Products Div.
St. Paul, Minnesota

28425
Serv-/-Link formerly
Bohannan Industries
Fort Worth, Texas

28478
Deltrol Controls Div
Deltrol Corporation
Milwaukee, Wisconsin

28480
Hewlett Packard Co.
Corporate HQ
Palo Alto, California

28520
Heyman Mfg. Co.
Kenilworth, New Jersey

29083
Monsanto, Co., Inc.
Santa Clara, California

29604
Stackpole Components Co.
Raleigh, North Carolina

30148
AB Enterprise Inc.
Ahoskie, North Carolina

30323
Illinois Tool Works, Inc.
Chicago, Illinois

31091
Optimax Inc.
Colmar, Pennsylvania

32539
Mura Corp.
Great Neck, New York

32767
Griffith Plastic Corp.
Burlingame, California

32879
Advanced Mechanical
Components
Northridge, California

32897
Erie Technological Products, Inc.
Frequency Control Div.
Carlisle, Pennsylvania

32997
Bourns Inc.
Trimpot Products Division
Riverside, California

33173
General Electric Co.
Products Dept.
Owensboro, Kentucky

34333
Silicon General
Westminister, California

34335
Advanced Micro Devices
Sunnyvale, California

34802
Electromotive Inc.
Kenilworth, New Jersey

37942
P.R. Mallory & Co., Inc.
Indianapolis, Indiana

42498
National Radio
Melrose, Massachusetts

43543
Nytronics Inc.
Transformer Co. Div.
Geneva, New York

44655
Ohmite Mfg. Co.
Skokie, Illinois

49671
RCA Corp.
New York, New York

49956
Raytheon Company
Lexington, Massachusetts

50088
Mostek Corp.
Carrollton, Texas

50579
Litronix Inc.
Cupertino, California

51605
Scientific Components Inc.
Linden, New Jersey

53021
Sangamo Electric Co.
Springfield, Illinois

54294
Cutler-Hammer Inc. formerly
Shallcross, A Cutter-Hammer Co.
Selma, North Carolina

55026
Simpson Electric Co.
Div. of Am. Gage and Mach. Co.
Elgin, Illinois

56289
Sprague Electric Co.
North Adams, Massachusetts

58474
Superior Electric Co.
Bristol, Connecticut

60399
Torin Corp. formerly
Torrington Mfg. Co.
Torrington, Connecticut

63743
Ward Leonard Electric Co., Inc.
Mount Vernon, New York

64834
West Mfg. Co.
San Francisco, California

65092
Weston Instruments Inc.
Newark, New Jersey

66150
Winslow Tele-Tronics Inc.
Eaton Town, New Jersey

70485
Atlantic India Rubber Works
Chicago, Illinois

70563
Amperite Company
Union City, New Jersey

70903
Belden Corp.
Geneva, Illinois

71002
Birnback Radio Co., Inc.
Freeport, New York

71400
Bussmann Mfg.
Div. of McGraw-Edison Co.
Saint Louis, Missouri

71450
CTS Corp.
Elkhart, Indiana

71468
ITT Cannon Electric Inc.
Santa Ana, California

71482
Clare, C.P. & Co.
Chicago, Illinois

71590
Centrelab Electronics
Div. of Globe Union Inc.
Milwaukee, Wisconsin

71707
Coto Coil Co., Inc.
Providence, Rhode Island

71744
Chicago Miniature Lamp Works
Chicago, Illinois

71785
TRW Electronics Components
Cinch Connector Operations Div.
Elk Grove Village
Chicago, Illinois

72005
Wilber B. Driver Co.
Newark, New Jersey

72092
Replaced by 06980

72136
Electro Motive Mfg. Co.
Williamantic, Connecticut

72259
Nytronics Inc.
Pelham Manor, New Jersey

72619
Dialight Div.
Amperex Electronic Corp.
Brooklyn, New York

72653
G.C. Electronics
Div. of Hydrometals, Inc.
Brooklyn, New York

72665
Replaced by 90303

72794
Dzus Fastener Co., Inc.
West Islip, New York

72928
Gulton Ind. Inc.
Gudeman Div.
Chicago, Illinois

Federal Supply Codes for Manufacturers (cont)

72982
Erie Tech. Products Inc.
Erie, Pennsylvania

73138
Bechman Instrument Inc.
Helipot Division
Fullerton, California

73293
Hughes Aircraft Co.
Electron Dynamics Div.
Torrance, California

73445
Amperex Electronic Corp.
Hicksville, New York

73559
Carling Electric Inc.
West Hartford, Connecticut

73586
Circle F Industries
Trenton, New Jersey

73734
Federal Screw Products, Inc.
Chicago, Illinois

73743
Fischer Special Mfg. Co.
Cincinnati, Ohio

73899
JFD Electronics Co.
Components Corp.
Brooklyn, New York

73949
Guardian Electric Mfg. Co.
Chicago, Illinois

74199
Quan Nichols Co.
Chicago, Illinois

74217
Radio Switch Corp.
Marlboro, New Jersey

74276
Signalite Div.
General Instrument Corp.
Neptune, New Jersey

74306
Piezo Crystal Co.
Carlisle, Pennsylvania

74542
Hoyt Elect. Instr. Works
Penacook, New Hampshire

74970
Johnson E.F., Co.
Waseca, Minnesota

75042
TRW Electronics Components
IRC Fixed Resistors
Philadelphia, Pennsylvania

75376
Kurz-Kasch Inc.
Dayton, Ohio

75378
CTS Knights Inc.
Sandwich, Illinois

75382
Kulka Electric Corp.
Mount Vernon, New York

75915
Littlefuse Inc.
Des Plaines, Illinois

76854
Oak Industries Inc.
Switch Div.
Crystal Lake, Illinois

77342
AMF Inc.
Potter & Brumfield Div.
Princeton, Indiana

77638
General Instrument Corp.
Rectifier Division
Brooklyn, New York

77969
Rubbercraft Corp. of CA. LTD.
Torrance, California

78189
Shakeproof
Div. of Illinois Tool Works Inc.
Elgin, Illinois

78277
Sigma Instruments, Inc.
South Braintree, Massachusetts

78488
Stackpole Carbon Co.
Saint Marys, Pennsylvania

78553
Eaton Corp. Engineered
Fastener Div.
Tinnerman Plant
Cleveland, Ohio

79136
Waldes Kohinoor Inc.
Long Island City, New York

79497
Western Rubber Company
Goshen, Indiana

79963
Zierick Mfg. Corp.
Mt. Kisko, New York

80031
Electro-Midland Corp.
Mepco Div.
A North American Phillips Co.
Norristown, New Jersey

80145
LFE Corp., Process Control Div.
formerly API Instrument Co.
Chesterland, Ohio

80183
Use 56289
Sprague Products
North Adams, Massachusetts

80294
Bourns Inc., Instrument Div.
Riverside, California

80583
Hammarlund Mfg. Co., Inc.
Red Bank, New Jersey

80640
Arnold Stevens, Inc.
South Boston, Massachusetts

81073
Grayhill, Inc.
La Grange, Illinois

81312
Winchester Electronics
Div. of Litton Industries Inc.
Oakville, Connecticut

81483
Therm-O-Disc Inc.
Mansfield, Ohio

81483
International Rectifier Corp.
Los Angeles, California

81590
Korry Mfg. Co.
Seattle, Washington

81741
Chicago Lock Co.
Chicago, Illinois

82305
Palmer Electronics Corp.
South Gate, California

82389
Switchcraft Inc.
Chicago, Illinois

82415
North American Phillips
Controls Corp.
Frederick, Maryland

82872
Roanwell Corp.
New York, New York

82877
Rotron Inc.
Woodstock, New York

82879
ITT Royal Electric Div.
Pawtucket, Rhode Island

83003
Varo Inc.
Garland, Texas

83058
The Carr Co., United Can Div.
of TRW
Cambridge, Massachusetts

83298
Bendix Corp.
Electric Power Div.
Eatontown, New Jersey

83330
Herman H. Smith, Inc.
Brooklyn, New York

83478
Rubbercraft Corp.
of America, Inc.
West Haven, Connecticut

83594
Burroughs Corp.
Electronic Components Div.
Plainfield, New Jersey

83740
Union Carbide Corp.
Battery Products Div.
formerly Consumer Products Div.
New York, New York

84171
Arco Electronics
Great Neck, New York

84411
TRW Electronic Components
TRW Capacitors
Ogallala, Nebraska

84613
Fuse Indicator Corp.
Rockville, Maryland

84682
Essex International Inc.
Industrial Wire Div.
Peabody, Massachusetts

86577
Precision Metal Products
of Malden Inc.
Stoneham, Massachusetts

86684
Radio Corp. of America
Electronic Components Div.
Harrison, New Jersey

86928
Seastrom Mfg. Co., Inc.
Glendale, California

87034
Illuminated Products Inc.
Subsidiary of Oak Industries Inc.
Anahiem, California

88219
Gould Inc.
Industrial Div.
Trenton, New Jersey

88245
Litton Systems Inc.
Useco Div.
Van Nuys, California

88419
Cornell-Dubilier Electronic Div.
Federal Pacific Co.
Fuquay-Varian, North Carolina

88486
Plastic Wire & Cable
Jewitt City, Connecticut

88690
Replaced by 04217

89536
John Fluke Mfg. Co., Inc.
Seattle, Washington

89730
G.E. Co., Newark Lamp Works
Newark, New Jersey

Federal Supply Codes for Manufacturers (cont)

90201
Mallory Capacitor Co.
Div. of P.R. Mallory Co., Inc.
Indianapolis, Indiana

90211
Use 56365
Square D Co.
Chicago, Illinois

90215
Best Stamp & Mfg. Co.
Kansas City, Missouri

90303
Mallory Battery Co.
Div. of Mallory Co., Inc.
Tarrytown, New York

91094
Essex International Inc.
Suglex/IWP Div.
Newmarket, New Hampshire

91293
Johanson Mfg. Co.
Boonton, New Jersey

91407
Replaced by 58474

91502
Associated Machine
Santa Clara, California

91506
Augat Inc.
Attleboro, Massachusetts

91637
Dale Electronics Inc.
Columbus, Nebraska

91662
Elco Corp.
Willow Grove, Pennsylvania

91737
Use 71468
Gremar Mfg. Co., Inc.
ITT Cannon/Gremar
Santa Ana, California

91802
Industrial Devices, Inc.
Edgewater, New Jersey

91833
Keystone Electronics Corp.
New York, New York

91836
King's Electronics Co., Inc.
Tuckahoe, New York

91929
Honeywell Inc.
Micro Switch Div.
Freeport, Illinois

91934
Miller Electric Co., Inc.
Div. of Aunet
Woonsocket, Rhode Island

92194
Alpha Wire Corp.
Elizabeth, New Jersey

93332
Sylvania Electric Products
Semiconductor Products Div.
Woburn, Massachusetts

94145
Replaced by 49956

94154
Use 94988
Wagner Electric Corp.
Tung-Sol Div.
Newark, New Jersey

94222
Southco Inc. formerly
South Chester Corp.
Lester, Pennsylvania

95146
Alco Electronic Products Inc.
Lawrence, Massachusetts

95263
Leecraft Mfg. Co.
Long Island City, New York

95264
Replaced by 98278

95275
Vitramon Inc.
Bridgeport, Connecticut

95303
RCA Corp.
Receiving Tube Div.
Cincinnati, Ohio

95348
Gordo's Corp.
Bloomfield, New Jersey

95354
Methode Mfg. Corp.
Rolling Meadows, Illinois

95712
Bendix Corp.
Electrical Components Div.
Microwave Devices Plant
Franklin, Indiana

95987
Weckesser Co. Inc.
Chicago, Illinois

96733
San Fernando Electric Mfg. Co.
San Fernando, California

96853
Gulton Industries Inc.
Measurement and Controls Div.
formerly Rustrak Instruments Co.
Manchester, New Hampshire

96881
Thomson Industries, Inc.
Manhasset, New York

97540
Master Mobile Mounts, Div. of
Whitehall Electronics Corp.
Ft. Meyers, Florida

97913
Industrial Electronic
Hardware Corp.
New York, New York

97945
Penwalt Corp.
SS White Industrial Products Div.
Piscataway, New Jersey

97966
Replaced by 11358

98094
Replaced by 49956

98159
Rubber-Teck, Inc.
Gardena, California

98278
Malco A Microdot Co., Inc.
Connector & Cable Div.
Pasadena, California

98291
Sealectro Corp.
Mamaroneck, New York

98388
Royal Industries
Products Div.
San Diego, California

98743
Replaced by 12749

98925
Replaced by 14433

99120
Plastic Capacitors, Inc.
Chicago, Illinois

99217
Bell Industries Elect.
Comp. Div.
formerly Southern Elect. Div.
Burbank, California

99392
STM
Oakland, California

99515
ITT Jennings Monrovia Plant
Div. of ITT Jennings formerly
Marshall Industries Capacitor Div.
Monrovia, California

99779
Use 29587
Bunker-Ramo Corp.
Barnes Div.
Landsdowne, Pennsylvania

99800
American Precision Industries Inc.
Delevan Division
East Aurora, New York

99942
Centrelab Semiconductor
Centrelab Electronics Div. of
Globe-Union Inc.
El Monte, California

Toyo Electronics
(R-Ohm Corp.)
Irvine, California

National Connector
Minneapolis, Minnesota

U.S. SALES OFFICES for all Fluke products

AK, Anchorage
Harry Lang & Associates
1371 Hillcrest Drive #303
Anchorage, AK 99503
(907) 279-5741

AL, Huntsville
John Fluke Mfg. Co., Inc.
3322 Memorial Parkway
Huntsville, AL 35801
(205) 881-6220
(404) 396-3224 (Atlanta)

AZ, Tempe
John Fluke Mfg. Co., Inc.
2125 S. 48th Street
Suite 104
Tempe, AZ 85282
(602) 967-8724
(602) 790-9881 (Tucson)

CA, Los Angeles
John Fluke Mfg. Co., Inc.
20902 South Bonita St.
Carson, CA 90746
(213) 538-3900 or
(714) 761-2449

CA, Santa Clara
John Fluke Mfg. Co., Inc.
2300 Walsh Ave., Bldg. K
Santa Clara, CA 95050
(408) 727-0513

CA, Tustin
John Fluke Mfg. Co., Inc.
15445 Red Hill Ave., Suite F
Tustin, CA 92680
(714) 838-8863
(714) 226-1254 (San Diego)

CO, Denver
John Fluke Mfg. Co., Inc.
1980 South Quebec St. #4
Denver, CO 80231
(303) 750-1222

CT, Hartford
John Fluke Mfg. Co., Inc.
124 Hebron Ave.
Glastonbury, CT 06033
(203) 633-0777

FL, Orlando
John Fluke Mfg. Co.,Inc.
940 N. Fern Creek Ave.
Orlando, FL 32803
(305) 896-4881

HI, Honolulu
EMC Corporation
2979 Ualena St.
Honolulu, HI 96819
(808) 836-1138

IA, Iowa City
John Fluke Mfg. Co., Inc.
1027 Hollywood Blvd., #309
Iowa City, IA 52240
(319) 354-2811

IL, Chicago
John Fluke Mfg. Co., Inc.
1400 Hicks Road
Rolling Meadows, IL 60008
(312) 398-0850

IN, Indianapolis
John Fluke Mfg. Co., Inc.
5610 Crawfordsville Rd.
Suite 802
Indianapolis, IN 46224
(317) 244-2456

KA, Kansas City
John Fluke Mfg. Co., Inc.
4550 West 109th St.
Suite 130
Shawnee Mission, KA 66211
(913) 381-9800

MA, Burlington
John Fluke Mfg. Co., Inc.
25 "B" Street
Burlington MASS
(617) 273-4674

MD, Rockville
John Fluke Mfg. Co., Inc.
5640 Fishers Lane
Rockville, MD 20852
(301) 770-1570
(301) 792-7060 (Baltimore)

MI, Detroit
John Fluke Mfg. Co., Inc.
13955 Farmington Rd.
Livonia, MI 48154
(313) 522-9140

MN, Minneapolis
John Fluke Mfg. Co., Inc.
7373 West 147th Street
Suite 196
Apple Valley, MN 55124
(612) 432-9400

MO, St. Louis
John Fluke Mfg. Co., Inc.
300 Brookes Dr., Suite 100
Hazelwood, MO 63042
(314) 731-3388

NC, Greensboro
John Fluke Mfg. Co., Inc.
1310 Beaman Place
Greensboro, NC 27408
(919) 273-1918

NJ, Paramus
John Fluke Mfg. Co., Inc.
P.O. Box 930
West 75 Century Road
Paramus, NJ 07652
(201) 262-9550

NM, Albuquerque
John Fluke Mfg. Co., Inc.
1108 Alvarado Drive N.E.
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Appendix 7A
Manual Change Information

INTRODUCTION

This appendix contains information necessary to backdate the manual to conform with earlier pcb configurations. To identify the configuration of the pcb's used in your instrument, refer to the revision letter (marked in ink) on the component side of each pcb assembly. Table 7A-1 defines the assembly revision levels documented in this manual with an X.

NEWER INSTRUMENTS

As changes and improvements are made to the instrument they are identified by incrementing the revision letter marked on the affected pcb assembly. These changes are documented on a supplemental change/errata sheet which, when applicable, is inserted at the front of the manual.

OLDER INSTRUMENTS

To backdate this manual to conform with earlier assembly revision levels, perform the changes indicated in Table 7A-1.

CHANGES

There are no backdating changes at this printing. All pcb assemblies are documented at their original revision level.

Table 7A-1. Manual Status and Backdating Information

Ref Or Option No.	Assembly Name	Fluke Part No.	* To adapt manual to earlier rev configurations perform changes in desending order (by no.), ending with change under desired rev letter																							
			—	A	B	C	D	E	F	G	H	J	K	L	M	N	P									
A1	Main PCB Assembly	476432		X																						
A2	Front Panel PCB Assy.	476499			X																					
A3	IEEE PCB Assembly	476465	X																							

* X = The PCB revision levels documented in this manual.
● = These revision letters were never used in the instrument.
–= No revision letter on the PCB.

Section 8
Schematic Diagrams

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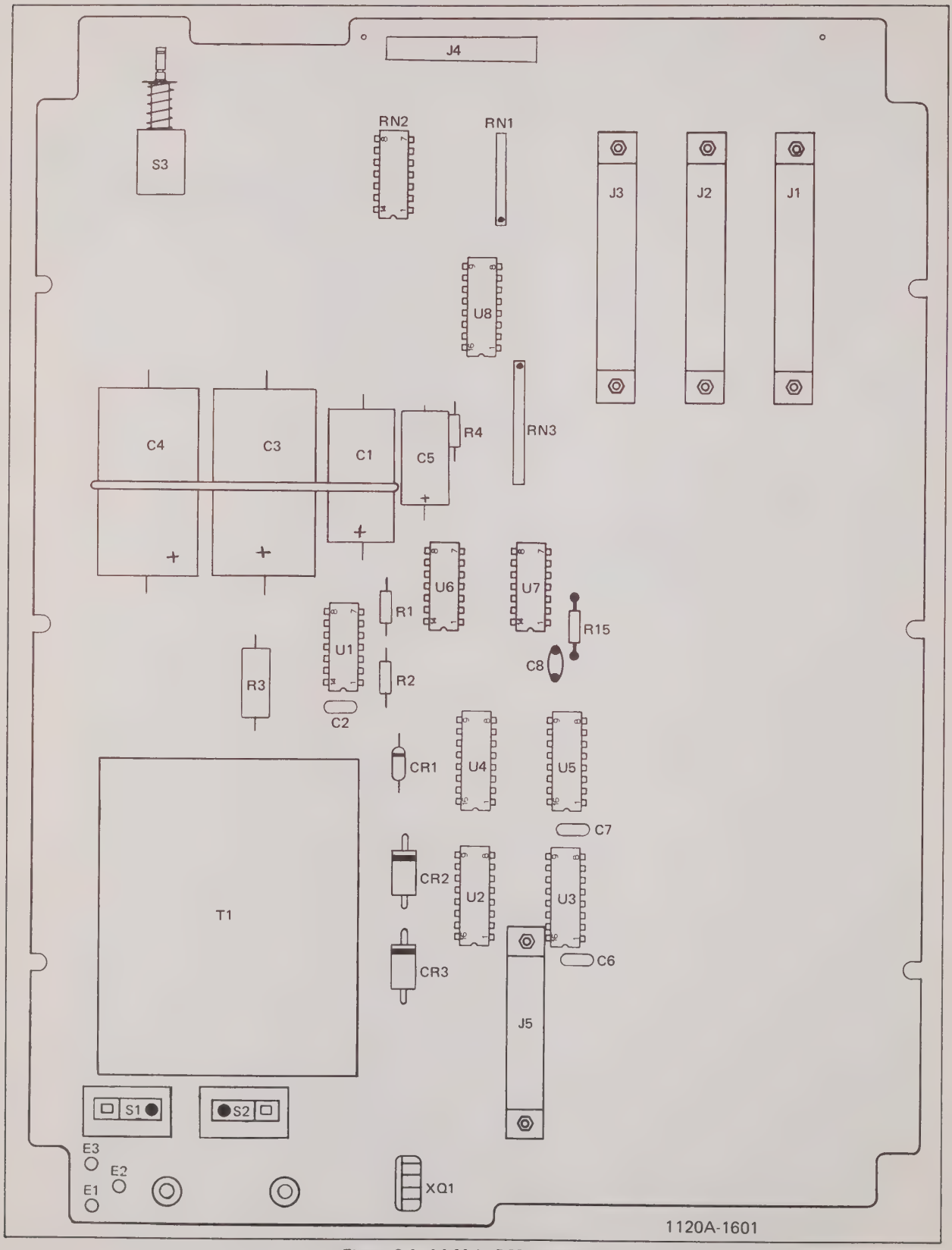
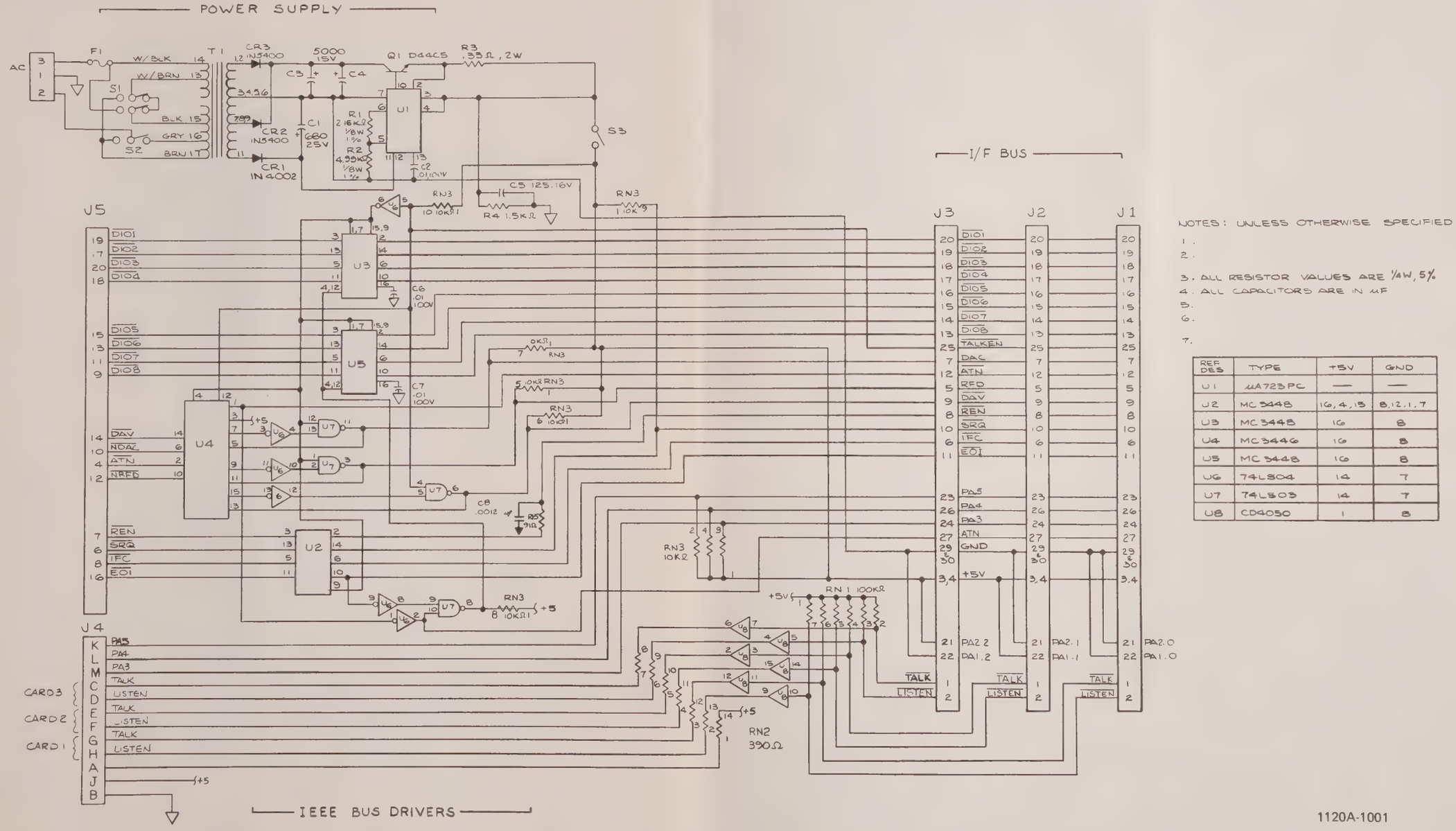


Figure 8-1. A1 Main PCB Assembly



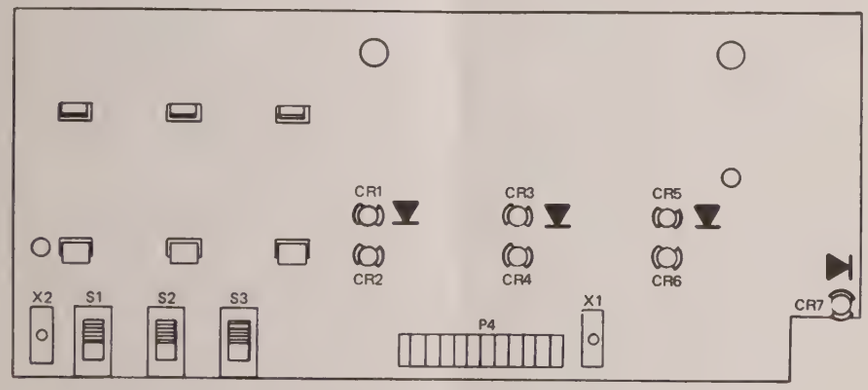
NOTES: UNLESS OTHERWISE SPECIFIED

1.
2.
3. ALL RESISTOR VALUES ARE 1/4W, 5%
4. ALL CAPACITORS ARE IN MF
5.
6.
7.

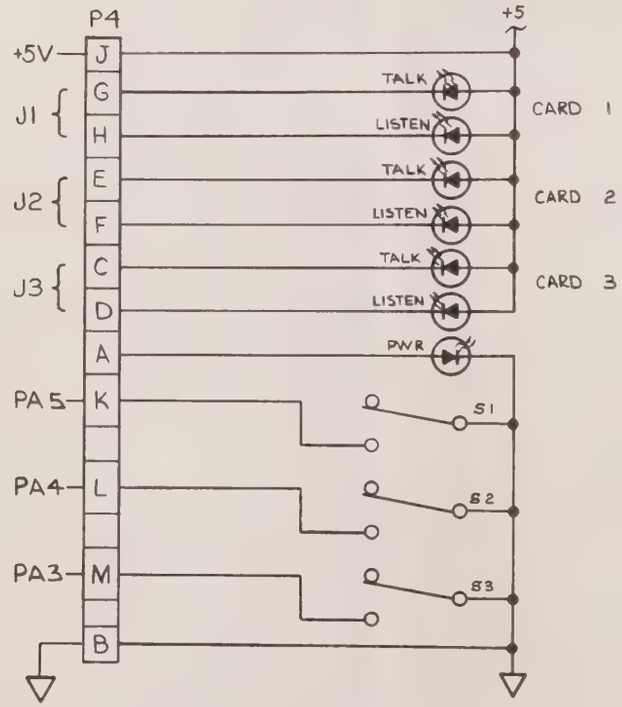
REF DES	TYPE	+5V	GND
U1	μA723PC	—	—
U2	MC3448	16, 4, 15	8, 12, 1, 7
U3	MC3448	16	8
U4	MC3446	16	8
U5	MC3448	16	8
U6	74LS04	14	7
U7	74LS03	14	7
U8	CD4050	1	8

1120A-1001

Figure 8-1. A1 Main PCB Assembly (cont)

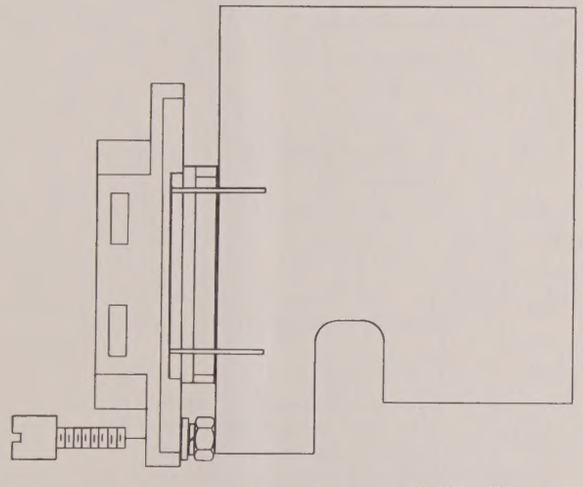


1120A-1602



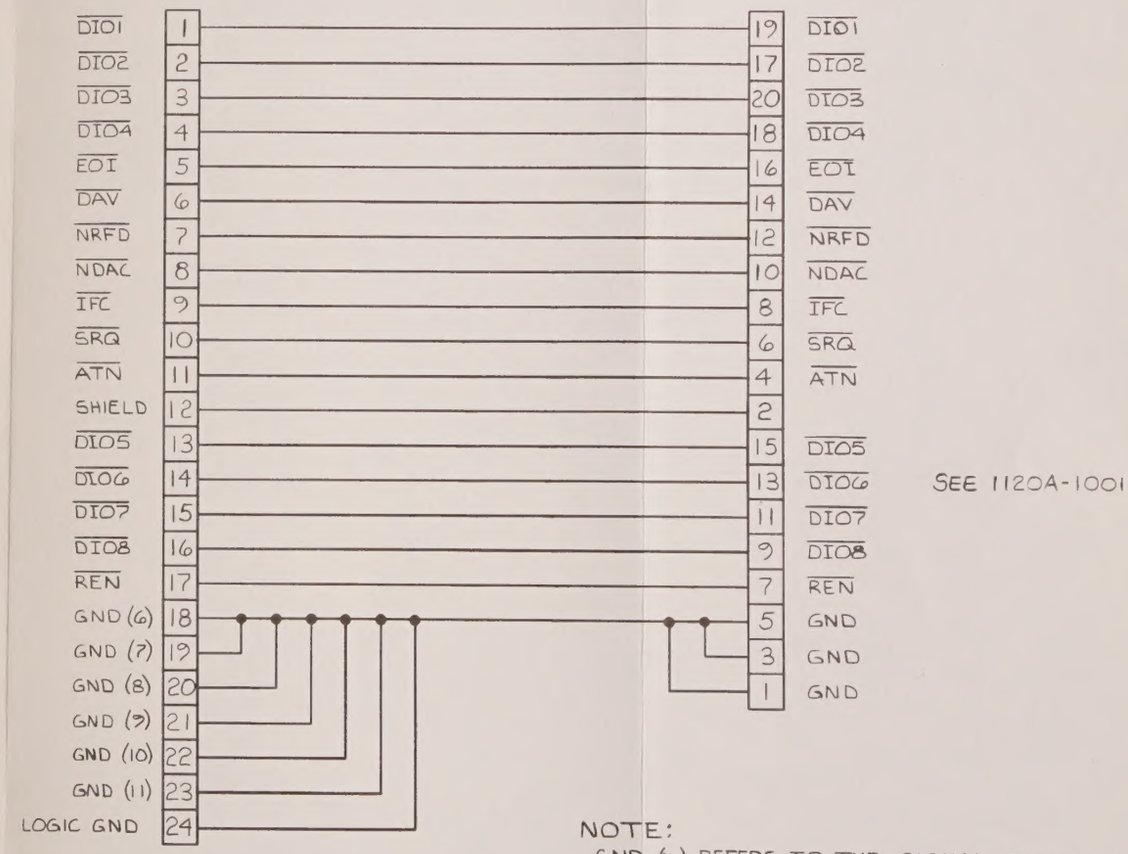
1120A-1002

Figure 8-2. A2 Front Panel PCB Assembly



1120A-1603

IEEE-488 BUS CONNECTOR



NOTE:
GND (n) REFERS TO THE SIGNAL GROUND RETURN OF THE REFERENCED CONTACT.

1120A-1003

Figure 8-3. A3 IEEE PCB Assembly

$\overline{DIO1}$-$\overline{DIO8}$	Data lines. Carry addresses, commands (ATN true). Carry data inputs, outputs (ATN false).
$\overline{REN}$	Remote Enable
$\overline{SRQ}$	Service Requests
$\overline{IFC}$	Interface Clear
$\overline{EOI}$	End Or Identify
$\overline{DAV}$	Data Valid
$\overline{NDAC}$	Not Data Accepted
$\overline{ATN}$	Attention
$\overline{NRFD}$	Not Ready For Data
PA5 PA4 PA3 PA2 PA1	5-Bit IEEE Address (correspond to A5-A1 identification on 1120A's front panel)
TALK LISTEN	Inputs to Front Panel LED Indicators (identify talk or listen mode status for each interfaced measurement instrument)
$\overline{TALKEN}$	Talk Enable (enables bus transceivers to send data)

Figure 8-4. List of Mnemonics